State of California
Department of Housing and Community Development

RECIRCULATED
DRAFT
ENVIRONMENTAL IMPACT REPORT

Adoption of Regulations Permitting Statewide Residential Use of Chlorinated Polyvinyl Chloride (CPVC) Plastic Plumbing Pipe without First Making a Finding of Potential Premature Metallic Pipe Failure Due to Local Water or Soil Conditions

Arnold Schwarzenegger, Governor

Lynn Jacobs, Director
Department of Housing and Community Development

November 2006
State Clearinghouse No. 2006012044

Interested parties are encouraged to review and comment on this EIR. The Lead Agency will review, consider, and respond to all significant environmental points raised prior to making a final determination on this project. Comments must be made in writing to:

Department of Housing and Community Development
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P.O. Box 952052
Sacramento, CA 94252-2052

FAX: 916-323-2815

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This EIR has been prepared by the Lead Agency. Those wishing to receive a copy of the EIR should contact Robin Gilb at the above address.

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Chapter 1.0

INTRODUCTION

1.1 Purpose of Environmental Impact Report

The State of California Department of Housing and Community Development (the Lead Agency) has prepared this Recirculated Draft Environmental Impact Report (RDEIR) to provide the public and interested public agencies with information about the potential environmental effects of the proposed Project.

This RDEIR was prepared in compliance with the California Environmental Quality Act (CEQA), and the CEQA Guidelines (California Code of Regulations [CCR], Title 14, Sections 15000-15387). As described in CEQA Guidelines Section 15121(a), an EIR is a public information document that assesses potential environmental impacts of a proposed project, as well as identifies mitigation measures and alternatives to the proposed project that could reduce or avoid adverse environmental impacts. CEQA requires state government agencies consider the environmental consequences of projects over which they have discretionary authority. The EIR is an informational document used in the planning and decision-making process. It is not the intent of an EIR to recommend either approval or denial of a project.

CEQA requires that a lead agency neither approve nor carry out a project as proposed unless the significant environmental effects have been mitigated to an acceptable level, or unless specific findings are made attesting to the infeasibility of altering the project to reduce or avoid environmental impacts (CEQA Guidelines Sections 15091 and 15092). CEQA also requires that decision-makers balance the benefits of a Proposed Project against its unavoidable environmental risks. If environmental impacts are identified as significant and unavoidable, the project may still be approved if it is demonstrated that social, economic, or other benefits outweigh the unavoidable impacts. The lead agency would then be required to state in writing the specific reasons for approving the project based on information presented in the EIR, as well as other information in the record. This process is defined as a “Statement of Overriding Considerations” by the CEQA Guidelines Section 15093.

1.2 Recirculated Draft EIR

The Lead Agency is recirculating the Draft EIR, which was published in July 2006, in accordance with CEQA Guidelines Section 15088.5 in order to provide more complete public disclosure regarding the potential environmental effects of the proposed Project. Pursuant to CEQA Guidelines Section 15088.5(f), a lead agency has the option of requiring commenters to submit new comments. In this case, the Lead Agency is planning to respond to all of the comments previously submitted, and commenters should limit their submissions regarding this Recirculated Draft EIR to new comments that are additional to comments previously submitted. The comments previously submitted have been considered in the preparation of this RDEIR, but specific responses to all comments submitted during both public review periods will be included in the Final EIR.

1.3 EIR Assumptions

This RDEIR is based on the following general assumptions:

- The Project will consist of the proposed California Plumbing Code sections as set forth and described in *Chapter 3.0, Project Description.*

- The existing use of residential water piping in California is broken up into three different categories: (1) Chlorinated Polyvinyl Chloride (CPVC) pipe, (2) copper pipe, and (3) “Other materials”. The estimated existing percent use of the various piping for residential potable water is as follows: (1) CPVC pipe - 13%, (2) copper pipe – 53.5%, and (3) other materials – 33.5%. As explained in Section 3.5.2 of this RDEIR, these assumptions are based on an average of 2004 and 2005 California aggregate data from a survey of builders conducted by the NAHB Research Center, a subsidiary of the National Association of Home Builders (NAHB).

- The future percentage use of CPVC pipe is estimated to be 32% for purposes of this RDEIR, assuming that CPVC use in California would be similar to use in the 49 other states, which do not have a similar Findings Requirement. This is a conservative estimate based on an average of national aggregate data for 2004 and 2005, showing that CPVC accounts for 25.5% of national market share, while copper pipe accounts for 51% of market share. “Other materials” make up approximately 23.5% of the residential pipe market. The estimate of CPVC’s share of the national market was rounded up to 30% and then a calculation was made using a weighted average to account for the fact that the national market data included California, where CPVC currently has a lower market share than it otherwise would have due to the Findings Requirement. The calculation resulted in an increase of 2% in the estimate of the market share of CPVC in the 49 other states; resulting in a total of 32%.

1.4 CEQA EIR Process

1.4.1 Lead Agency/Project Sponsor

The State of California Department of Housing and Community Development is the State Lead Agency for consideration of the proposed Project. Sections 15050 and

15367 of the CEQA Guidelines define the "Lead Agency" as the "public agency that has the principal responsibility for carrying out or approving a project."

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1.4.2 Background of the Current EIR

Consideration of the unrestricted use of chlorinated polyvinyl chloride (CPVC) pipe for residential potable water piping has a long history in California. In 1982, for the first time, the Uniform Plumbing Code, published by the International Association of Plumbing and Mechanical Officials, permitted the use of CPVC for potable water plumbing. The Lead Agency proposed to adopt this expanded use as part of its routine adoption of the 1982 Uniform Plumbing Code. However, various objections were raised, resulting in the decision to prepare an environmental impact report (EIR). A task force of stakeholders mutually agreed upon the scope of the EIR and further agreed to jointly fund the preparation of the EIR by a private consultant. It took until 1989 before a draft EIR was ready for circulation. The draft generated such voluminous comments that the effort to complete a final EIR at that time was abandoned.

Through an act of the Legislature, CPVC pipe was permitted for residential use subject to certain installation and worker safety measures from October 1995 through December 31, 1997, when the legislation expired by its own terms. Also in 1997, the Lead Agency performed an Initial Study of CPVC pipe for the same use. The Initial Study led to the circulation of a Draft EIR (1997 DEIR).[1]

The Lead Agency concluded in the 1997 DEIR that the statewide approved use of CPVC water pipe would not result in significant adverse impacts on the environment. In 1998, the final EIR was certified. The Lead Agency subsequently was sued by plaintiffs

[1] State Clearinghouse No. 970820040.

who claimed the EIR was insufficient and failed to comply with CEQA. The action was settled out of court in September 2000 with a court-approved settlement agreement. The Lead Agency agreed to rescind the certification of the 1998 Final EIR and its regulatory approval of CPVC, and the plaintiffs dropped the lawsuit.[2] Working with the plaintiffs, the Lead Agency again prepared an Initial Study, but this time the project was limited to the use of CPVC pipe in residential potable water systems ONLY where a finding had been made that there was or would be a premature failure of metallic pipe because of corrosive water and/or soil conditions (referred to as the "Findings Requirement") <u>and</u> where certain mitigation measures were used. Based on the Initial Study, the Lead Agency found, in light of the whole record before it, that there was no substantial evidence that the project would have a potential significant impact on the environment.

As a result of these findings, the Lead Agency prepared, again with the cooperation of the plaintiffs, a Mitigated Negative Declaration (2000 MND) pursuant to CEQA and circulated the document for public review and comment. The Lead Agency adopted the 2000 MND in November 2000.[3] The adopted 2000 MND did not limit the number localities that were authorized to make findings. As long as the mitigation measures were employed and the Findings Requirement was satisfied, the 2000 MND authorized statewide use of CPVC pipe in all residential structures. No timely lawsuits were brought to contest the validity of the Initial Study or the Lead Agency's findings, the CEQA process followed by the Lead Agency, or the adoption or contents of the 2000 MND. The Lead Agency proposed, and the California Building Standards Commission ultimately approved, amendments to the California Plumbing Code that permitted the use of CPVC pipe for residential potable water distribution subject to the Findings Requirement and specified mitigation measures, which consisted of certain flushing and worker safety requirements.

In March 2005, the Lead Agency prepared a Draft Addendum to the adopted 2000 MND (the "Draft Addendum"). The Draft Addendum project was the same as the 2000 MND project, except that the Findings Requirement was removed. Removal of the Findings Requirement would have made CPVC pipe accessible to all Californians as a plumbing material alternative. A number of comments were submitted regarding the Draft Addendum, many of which supported the Draft Addendum. Some of the comments, however, argued that an addendum was not an appropriate CEQA document to use in this situation on the basis that the proposed action was an entirely different project than

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[2] See "Rescinding of the Certification and Notice of Determination for the Final Environmental Impact Report Entitled Chlorinated Polyvinyl Cholride (CPVC) Pipe Used for Potable Water Piping in Residential Buildings," State Clearinghouse No. 970820040.

[3] See CEQA document, State Clearinghouse No. 2000091089.

the action analyzed in the 2000 MND and thus a full EIR analyzing the impacts of the “new” project was required. The Lead Agency considered this and the other comments on the Draft Addendum and decided that the public would be better served by an EIR that would provide a more in-depth analysis of the potential impacts of the removal of the Findings Requirement.

The Lead Agency does not agree that the Draft Addendum project was a totally “new” project. Both projects were for CPVC pipe use in residential potable water distribution. Both projects required the same mitigation measures. The Draft Addendum project only differed from the 2000 MND project in its removal of the Findings Requirement. While it is true that removal of the Findings Requirement could lead to increased CPVC use, it would have no effect on the impacts associated with individual applications. Removal of the Findings Requirement does not increase the impacts on potable water quality, worker safety (on a single-installation basis), or the risk of fire-associated impacts.

The Draft Addendum was also criticized for using estimates and assumptions. However, such methods are unavoidable for this type of project. This is not a typical CEQA project where a specific, discrete action will be taken and where the impacts are known with a reasonable degree of certainty. Rather, this project involves a change in a regulation. By itself, this will cause no direct impacts to the environment. However, it may cause indirect changes in the environment when others act on that regulation. Accordingly, estimates and assumptions are necessary because of the number of uncertain variables. It is not possible to predict exactly how many houses will be built with CPVC plumbing; when or where they will be built; how big they will be; what exact number of plumbing fixtures will be used; what type of cement the plumber will use; how much cement and primer will be used; what the temperature, humidity and barometric pressure will be on the day the installation is done; or any number of other factors that affect the environmental impacts of CPVC pipe use.

This current EIR is a Subsequent EIR to the 2000 MND prepared pursuant to CEQA Guidelines Section 15162. Thus, this EIR evaluates the proposed change to the existing California Plumbing Code regulation regarding the use of CPVC for residential plumbing systems and the impact of that change. As such, this EIR will not repeat the review of impacts that remain the same as those addressed in the 2000 MND. It does not evaluate whether or not CPVC should be allowed in California in the first instance in residential structures, because such use of CPVC is already allowed throughout the state, provided that the required finding is made. This EIR does evaluate the potential increase in the use of CPVC if the Findings Requirement is deleted. With respect to all other impacts and all other information, the analysis of the 2000 MND continues to apply and is incorporated into this EIR. The 2000 MND is available and can be reviewed by the public upon request at the Department of Housing and Community Development, 1800 3rd Street, Room 440, Sacramento, CA 95814.

1.4.3 Notice of Preparation

In accordance with Section 15082 of the CEQA Guidelines, the Lead Agency circulated a Notice of Preparation (NOP) for this EIR on January 11, 2006, for a 30-day review period that expired in February 2006. A copy of the NOP and the distribution list are attached in Appendix A. The Lead Agency received two comments on the NOP. The first was from the law firm of Adams Broadwell Joseph & Cardozo who submitted a letter on behalf of the Coalition for Safe Building Materials. The letter supported the Lead Agency's decision to conduct an EIR on the Project. The second comment was a letter from the Department of Toxic Substance Control (DTSC), Human and Ecological Risk Division. The letter indicated that the proposed project did not appear to involve any new materials or risks and did not fall under the responsibility or regulatory purview of DTSC.

1.4.4 Scoping Meeting

The Lead Agency held a scoping meeting for the proposed Project pursuant to CEQA Guidelines Section 15082. The purpose of the scoping meeting was to solicit input from agencies, organizations, and individuals to assist the lead agency in determining the scope and content of the EIR. A Department Scoping Meeting was held on May 1, 2006. No agencies, other than the Lead Agency attended the meeting. The Department Scoping Meeting Notice and Distribution List are attached in Appendix B.

1.4.5 Recirculated Draft EIR

This document constitutes the Recirculated Draft EIR. The RDEIR contains a description of the Project, description of the environmental setting, identification of Project and cumulative impacts and mitigation measures for potential impacts found to be significant, as well as an analysis of project alternatives.

1.4.6 Public Review

This document is being recirculated to local, and state agencies and to interested organizations and individuals who may wish to review and comment on the report. Publication of this RDEIR marks the beginning of a 45-day public review period. During this review period, written comments may be sent to the following address:

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The Lead Agency will respond to comments received during the 45-day period, which begins on November 15, 2006, and expires on December 29, 2006. Comments received after that date may not receive a response. Comments on this RDEIR should be limited to new comments that are additional to comments previously submitted during the initial public review period for the July 2006 Draft EIR. Comments submitted on the July 2006 Draft EIR have been considered in the preparation of this RDEIR, but specific responses to all comments submitted during both public review periods will be included in the Final EIR.

1.4.7 Final EIR and EIR Certification

Written comments received in response to the DEIR and RDEIR will be addressed in a Response to Comments addendum document, which together with any revisions to the RDEIR text, will constitute the Final EIR. Taken together, the RDEIR and the Final EIR will constitute the complete EIR for the proposed Project. The Lead Agency will then review the Project, the EIR, and public testimony to decide whether to certify the EIR and approve the Project. If the EIR contains unmitigated significant impacts, the Lead Agency must state its reasons for approval in a document called the Findings of Fact and Statement of Overriding Considerations, include this document in the record of the project approval, and mention this document in the Notice of Determination.

1.4.8 Mitigation Monitoring and Reporting Program

Section 21081.6 of the California Public Resources Code requires lead agencies to "adopt a reporting and mitigation monitoring program (MMRP) for the changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment." The MMRP is not required to be included in this RDEIR; however, mitigation measures have been clearly identified and presented in language that will facilitate the establishment of the MMRP. Any mitigation measures adopted by the Lead Agency as conditions of approval for the Project will be included in the MMRP to verify compliance. The MMRP will also identify the responsible parties for implementing and for monitoring each mitigation measure.

1.5 Terminology Used in the EIR

This RDEIR uses the following terminology to describe environmental effects of the Proposed Project and Alternatives:

- **Significance Criteria:** A set of criteria used by the Lead Agency to determine at what level or "threshold" an impact would be considered significant. Significance criteria used in this EIR include factual or scientific information; regulatory standards of local, state, and federal agencies; and/or guiding and implementing goals and policies identified in local plans.

- **Less Than Significant Impact:** A less than significant impact would cause no substantial change in the environment (no mitigation required).

- **Less Than Significant Level:** The level below which an impact would cause no substantial change in the environment (no mitigation required).

- **Potentially Significant Impact:** A potentially significant impact may cause a substantial change in the environment; however, it is not certain that project effects would exceed specified significance criteria. For CEQA purposes, a potentially significant impact is treated as if it were a significant impact.

- **Significant Impact:** A significant impact would cause a substantial adverse change in the physical conditions of the environment. Significant impacts are identified by the evaluation of project effects using specified significance criteria. Mitigation measures and/or project alternatives are identified to reduce project effects to the environment.

- **Significant and Unavoidable Impact:** A significant and unavoidable impact would result in a substantial change in the environment that cannot be avoided or mitigated to a less-than-significant level if the project is implemented.

- **Cumulative Significant Impact:** A cumulative significant impact would result in a substantial change in the environment from effects of the project as well as surrounding projects and reasonably foreseeable development in the surrounding area. To be considered significant a project's impact must be a cumulatively considerable contribution to a substantial change in the environment.

The RDEIR also identifies mitigation measures for all significant or potentially significant environmental impacts. Mitigation includes measures set forth and described in the EIR that the Lead Agency potentially could require that would:

(a) avoid the impact altogether by not taking a certain action or parts of an action;

(b) minimize impacts by limiting the degree or magnitude of the action and its implementation;

(c) rectify the impact by repairing, rehabilitating, or restoring the affected environment;

(d) reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action; and

(e) compensate for the impact by replacing or providing substitute resources or environments.

CEQA does not require mitigation measures to be set forth and described for those impacts that are determined to be less than significant. In the case of this EIR, several impacts have been identified as less than significant. In some cases, the Lead Agency has determined that certain impacts are less than significant in part due to the already existing mitigation measures that were incorporated into Section 301.0 of Appendix I, Installation Standards, California Plumbing Code, as part of the project analyzed in the 2000 MND.

1.6 RDEIR Organization

This Recirculated Draft EIR is organized into eight chapters as described below.

- **Chapter 1.0, Introduction.** This chapter describes the purpose and organization of the EIR and the EIR preparation, review and certification process.

- **Chapter 2.0, Executive Summary.** This chapter provides a summary of the Proposed Project, environmental impacts that would result from project implementation, a summary of project alternatives, and the potential areas of controversy. This chapter also includes a table summarizing the impacts of the proposed Project and mitigation measures that have been identified.

- **Chapter 3.0, Project Description.** This chapter describes the project background, outlines project objectives, and summarizes components of the proposed Project, pursuant to CEQA Guidelines Section 15124. The Project Description also describes subsequent development and approvals for which this EIR may be used.

- **Chapter 4.0, Environmental Analysis.** Each environmental issue area in this chapter describes the existing environmental and regulatory setting, discusses the environmental impacts associated with the Project, and identifies mitigation measures for significant and potentially significant impacts of the proposed Project, pursuant to CEQA Guidelines Sections 15125, and 15126.

- **Chapter 5.0, Analysis of Alternatives.** Chapter 5.0 describes alternatives to the proposed Project. Although the alternatives are not analyzed at the same level of detail as the Project; they are presented in order to identify options that could mitigate environmental impacts, pursuant to CEQA Guidelines Section 15126.6.

- **Chapter 6.0, Other Considerations.** Chapter 6.0 discusses the following:

    - Effects not found to be significant;

    - Growth-inducing impacts (i.e. the potential for the Proposed Project to induce urban growth and development, pursuant to CEQA Guidelines Section 15126(d));

    - Potential indirect impacts that may result from the Project, pursuant to CEQA Guidelines 15126.4 (a)(1)(D), 15358 (a)(2) and 15064 (d);

    - Cumulative impacts (i.e. the potential for the Project to result in cumulative impacts, pursuant to CEQA Guidelines Section 15130);

    - Significant unavoidable adverse impacts of the Project, pursuant to CEQA Guidelines 15126(b); and

    - Significant irreversible environmental changes related to the implementation of the Project, pursuant to CEQA Guidelines Sections 15126.2 (c) and 15127.

- **Chapter 7.0, Report Preparation.** Chapter 7.0 provides the names of the RDEIR authors and consultants, pursuant to CEQA Guidelines Section 15129.

- **Chapter 8.0, Bibliography.** Chapter 8.0 provides a list of reference materials and persons consulted during the preparation of the RDEIR.

- **Appendices.** The appendices are located at the back of the RDEIR and are referenced in the Table of Contents.

Chapter 2.0

EXECUTIVE SUMMARY

2.1 Introduction

This chapter provides a summary of the proposed Project, environmental impacts that would result from project implementation, a summary of project alternatives, and the potential areas of controversy. This chapter also includes a table summarizing the impacts of the proposed Project and mitigation measures that have been identified to reduce potentially significant impacts to less than significant levels.

2.2 Project Location

If the proposed regulations are adopted, increased use of CPVC pipe is anticipated in residential buildings throughout the State of California. The net effect of adoption of the proposed regulations is estimated to be an increase in the use of CPVC for potable water conveyance, with a proportionate decrease in the use of other materials.

2.3 Project Description

The project is the adoption of regulations (i.e., building standards) pertaining to the use of CPVC pipe for potable water piping in buildings under the jurisdiction of the Lead Agency which include: hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including accessory buildings, facilities, and uses thereto; as well as permanent buildings, and permanent accessory buildings or structures, constructed within mobile home parks and special occupancy parks that are under the control and ownership of the park operator.

In this EIR, the terms “CPVC” and “CPVC pipe” refer to chlorinated polyvinyl chloride pipe, fittings, and the materials used to join CPVC pipe and fittings, unless the context clearly indicates otherwise. These regulations, if approved, would become part of the California Plumbing Code, which is a segment of the California Building Standards Code. The California Building Standards Commission is responsible for final adoption of the California Building Standards Code. The California Building Standards Commission receives proposed codes from a number of public agencies which have statutory authority to propose codes for various types of occupancies. The code provisions related to potable water piping in residential buildings are the responsibility of the Lead Agency.

The modifications to the existing plumbing code would entail removing the current requirement that a building official make a finding that there is or will be the premature failure of metallic pipes due to existing water or soil conditions (referred to as the "Findings Requirement") prior to allowing CPVC to be used for potable water piping. The express terms of the proposed code change appear in Chapter 3 of this RDEIR.

2.4 Issues to be Resolved and Areas of Controversy

In accordance with Section 15082 of the CEQA Guidelines, the Lead Agency circulated a Notice of Preparation (**NOP**) for the DEIR on January 11, 2006, for a 30-day review period. These notices were circulated to the public, local and state agencies, and other interested parties to inform responsible agencies and the public that the Project could have significant effects on the environment and to solicit their comments. The NOP and comments received in response to the NOP are presented in Appendix C.

This current EIR is a Subsequent EIR to the 2000 Mitigated Negative Declaration prepared pursuant to CEQA Guidelines Section 15162. Thus, this EIR evaluates the proposed change to the existing California Plumbing Code regulation regarding the use of CPVC for residential plumbing systems and the impact of that change. As such, this EIR will not repeat the review of impacts that remain the same as those addressed in the 2000 MND. It does not evaluate whether or not CPVC should be allowed in California in the first instance in residential structures, because such use of CPVC is already allowed throughout the state, provided that the required finding is made. This EIR does evaluate the potential increase in the use of CPVC if the Findings Requirement is deleted. With respect to all other impacts and all other information, the analysis of the 2000 MND continues to apply and is incorporated into this EIR. The following environmental resources were found to have the potential of being significantly affected by the proposed Project and have been addressed in greater detail in this EIR.

1. Air Quality
2. Water Quality
3. Worker Safety
4. Solid Waste

Issues that were previously addressed in the 2000 MND and which remain the same, and which therefore were not further evaluated in this EIR include:

1. Land Use Consistency
2. Transportation / Circulation
3. Population / Housing
4. Geology / Soils

5. Agricultural Resources
6. Noise
7. Biological Resources
8. Drainage and Hydrology
9. Hazards and Hazardous Materials
10. Cultural Resources
11. Aesthetics
12. Recreation
13. Mineral Resources

Potential areas of controversy surrounding the Project identified as part of the NOP process that are evaluated in Chapter 4.0 of the Recirculated Draft EIR are shown below:

Environmental Topic	Areas of Controversy
Air Quality	Claims regarding air quality impacts as a result of Reactive Organic Gas (ROG) emissions from CPVC adhesives.
Water Quality	Claims regarding contamination of drinking water and receiving water bodies due to leaching of organotins, precursors to disinfection byproducts, or other materials found in CPVC residential potable water systems.
Worker Safety	Claims regarding inhalation exposure to vapors from CPVC adhesives during installation, dermal exposure to CPVC adhesives, carcinogenic effects from adhesives, and enforcement of existing ventilation and glove worker safety mitigation measures in the California Plumbing Code.
Solid Waste	Claims regarding landfill capacity to serve solid waste disposal needs related to the Project.

2.5 ALTERNATIVES TO THE PROPOSED PROJECT

2.5.1 ALTERNATIVES TO THE PROPOSED PROJECT (PP)

CEQA Guidelines Sections 15126 and 15126.6 require an EIR to consider a reasonable range of alternatives that could feasibly attain the basic objectives of the proposed project. This Recirculated Draft EIR analyzes three alternatives in addition to the proposed Project: 1) No project; 2) Delete the Findings Requirement and require the use of Low-VOC cements and primers for joining CPVC pipe; and 3) Delete the Findings Requirement and require the use of Low-VOC, one-step cements. Low-VOC cements and primers are CPVC adhesives that do not require the use of primers and have a limited amount of volatile organic compounds (VOCs). One-step cements are CPVC cements that do not require the use of primers

2.6 SUMMARY OF ENVIRONMENTAL IMPACTS

Table 2-1 presents a summary of project impacts, and proposed mitigation measures to reduce potentially significant impacts. The table is arranged in four columns: 1) significant impacts; 2) level of significance without mitigation; 3) mitigation measures; and 4) level of significance after mitigation.

Levels of significant are categorizes as follows: SU = Significant and Unavoidable; S = Significant; LTS = Less Than Significant. For detailed discussions of all project impacts and mitigation measures, please refer to the environmental analysis sections in Chapter 4.0.

Table 2-1 – Summary of Impacts and Mitigation Measures

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance with Mitigation
Air Quality			
Impact 4.2–1: The Project Could Increase ROG Emissions in Several Air Districts to a Level that Exceeds the ROG Significance Thresholds Established by Those Districts. Each California air district has established ROG significance thresholds. Those thresholds are based on either tons per year or pounds per day limits (see Table C-1). Those thresholds, along with the Project's contribution to ROG emissions in each air district, are compared in Tables 4.2.4.14 and 4.2.4.15. Those	S	**Mitigation Measure 4.2-1*:*** Require the Use of One-Step Cement (Without Primer)	SU

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance with Mitigation
tables show that the Project would generate ROG emissions exceeding the most restrictive significance thresholds in the following air districts: • Bay Area Air Quality Management District; • Feather River Air Quality Management District; • Mojave Desert Air District; • Sacramento Metropolitan Air Quality Management District; • San Luis Obispo County Air Pollution Control District, • San Joaquin Valley Air Pollution Control District; and • South Coast Air Quality Management District.			
Water Quality			
Impact 4.3-1: Leachates. There is the potential that materials within CPVC or materials used in CPVC installation could contaminate the water carried through the pipe.	LTS	None required.	
Impact 4.3-2: Disinfection	LTS	None required.	

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance with Mitigation
Byproducts (DBPs) Freshly installed CPVC plumbing systems can leach organics into drinking water that may serve as DBP precursors.			
Worker Safety			
Impact 4.4-1: Inhalation Exposure to Vapors from CPVC Installation.	LTS	None required.	
Impact 4.4-2: Dermal Exposure to Adhesives	LTS	None required	
Impact 4.4-3: Carcinogenic Effects from Adhesives	LTS	None required	
Impact 4.4-4: Enforcement of California Plumbing Code Regulations and Mitigation Measures	LTS	None required	
Solid Waste			
Impact 4.5-1: Landfill Capacity. The Project may result in disposal of CPVC pipe in landfills to a minor degree during CPVC pipe installation (due to the discarding of scraps). A somewhat greater degree of disposal may occur when the CPVC pipe is replaced, although during most replacement jobs the existing pipe is left in place and not disposed in landfills. Most disposal of CPVC pipe in	LTS	None required.	

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance with Mitigation
landfills would occur when residential structures plumbed with CPVC are demolished.			
Impact 4.5-2: Compliance with Statutes and Regulations.	LTS	None required.	
Cumulative Impacts			
Cumulative Air Quality Impacts: The Project will indirectly generate ozone precursors that could lead to ozone formation. Several areas within California are classified as non-attainment for state and federal ozone regulations. Even a small addition of ozone to these areas by the Project would be considered to be an incremental effect that would contribute to the problem in a manner that is cumulatively considerable.	S	**Mitigation Measure 4.2-1**: Require the Use of One-Step Cement (Without Primer)	SU
Cumulative Water Quality Impacts: The Project potentially could have a cumulative water quality impact if the increased use of the existing flushing mitigation measure in Section 301.0.1, Appendix I, Installation Standards, California Plumbing Code, which was adopted as part of project analyzed in the 2000 MND, that would occur as a result of the increase in CPVC usage for residential	LTS	None required.	

Environmental Impacts	Level of Significance Without Mitigation	Mitigation Measures	Level of Significance with Mitigation
potable water systems, would add pollutants to already stressed sensitive waster bodies.			

Chapter 3.0

PROJECT DESCRIPTION

3.1 Introduction

This chapter provides a detailed description of the proposed Project. The Project is a change in existing regulations which allow the statewide use of CPVC for residential plumbing systems. Currently, CPVC pipe is allowed for residential potable water systems, subject to two conditions. First, certain mitigation measures must be followed. Those mitigation measures are set forth in the applicable regulations and therefore have the effect of governing law applicable to CPVC use. The second condition that applies to the existing statewide use of CPVC for residential plumbing is the requirement that a local building official must make a finding that there is or will be the premature failure of metallic pipes due to existing water or soil conditions, prior to allowing the use of CPVC. The proposed Project is to delete this finding requirement so that CPVC may be used for any residential occupancy in the State of California, subject to the existing mitigation measures, but without the requirement for a finding by the local building official.

3.2 Project Location

The Project is a proposed change in the regulations governing the use of CPVC in residential uses throughout the State of California. CPVC is already permitted on a statewide basis provided that the local building official makes a finding that there is a risk of premature pipe failure. The proposed action is to delete this finding requirement and allow the statewide use of CPVC to continue without any need for the adoption of a finding by the local building official. Thus, there is no specific project site for the proposed action, but if the action is adopted CPVC will be available for use without a finding requirement for the broad range of residential uses. These uses may be located throughout the State of California, and may include such residential uses as hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including accessory buildings, facilities, and uses thereto; as well as permanent buildings, and permanent accessory buildings or structures, constructed within mobile home parks and special occupancy parks that are under the control and ownership of the park operator. The rule change will allow for the use of CPVC pipe without building official consent within all of these stated residential uses within the State of California. The proposed action does not include any changes regarding the use of CPVC in other occupancies besides residential uses.

3.3 Project Background

Consideration of unrestricted use of CPVC pipe for residential potable water piping has a long history of consideration in California. In 1982, for the first time, the Uniform Plumbing Code, published by the International Association of Plumbing and Mechanical Officials, permitted the use of CPVC for potable water plumbing. The Department of Housing and Community Development (Lead Agency) proposed to adopt this expanded use as part of its routine adoption of the 1982 Uniform Plumbing Code. However, various objections were raised resulting in the decision to prepare an EIR. A task force of stakeholders mutually agreed upon the scope of the EIR and further agreed to jointly fund the preparation of the EIR by a private consultant. It took until 1989 before a draft EIR was ready for circulation. The draft generated such voluminous comments the effort to complete a final EIR was abandoned. Through an act of the Legislature, CPVC pipe was permitted for residential use subject to certain installation and worker safety measures from October 1995 through December 31, 1997, when the legislation expired by its own terms. Also in 1997, the Lead Agency performed an Initial Study of CPVC pipe for the same use. The Initial Study led to the circulation of a Draft EIR (DEIR) in 1997.[4]

The Lead Agency concluded in the 1997 DEIR that the statewide approved use of CPVC water pipe would not result in significant adverse impacts on the environment. In 1998, the final EIR was certified. The Lead Agency subsequently was sued by plaintiffs who claimed the EIR was insufficient and failed to comply with CEQA. The action was settled out of court in September of 2000 with a court-approved settlement agreement. The Lead Agency agreed to rescind the certification of the EIR and its regulatory approval of CPVC, and the plaintiffs dropped the lawsuit.[5] Working with the plaintiffs, the Lead Agency again prepared an Initial Study, but this time the project was limited to the use of CPVC pipe in residential potable water systems ONLY where a finding had been made that there was or would be a premature failure of metallic pipe because of corrosive water and/or soil conditions (referred to as the “Findings Requirement”) <u>and</u> where certain mitigation measures were used. Based on the Initial Study, the Lead Agency found, in light of the whole record before it, that there was no substantial evidence that the project would have a potential significant impact on the environment.

As a result of these findings, the Lead Agency prepared, again with the cooperation of plaintiffs, a Mitigated Negative Declaration (2000 MND) pursuant to CEQA and

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[4] State Clearinghouse No. 970820040

[5] See “Rescinding of the Certification and Notice of Determination for the Final Environmental Impact Report Entitled Chlorinated Polyvinyl Chloride (CPVC) Pipe Used For Potable Water Piping in Residential Buildings,” State Clearing house Number 970820040.

circulated the document for public review and comment. The Lead Agency adopted the 2000 MND in November 2000.[6] The code change analyzed in the 2000 MND, which was subsequently approved, did not limit the number of localities that were authorized to make findings. As long as the mitigation measures were employed and the Findings Requirement was satisfied, the code change that was analyzed in the 2000 MND authorized statewide use of CPVC pipe in all residential structures. No timely lawsuits were brought to contest the validity of the Initial Study or the Lead Agency's findings, the CEQA process followed by the Lead Agency, or the adoption or contents of the MND. The Lead Agency proposed, and the California Building Standards Commission ultimately approved, amendments to the California Plumbing Code that permitted the use of CPVC pipe for residential potable water distribution subject to the Findings Requirement and specified installation and worker safety requirements.

In March 2005, the Lead Agency prepared a Draft Addendum to the adopted Mitigated Negative Declaration ("Draft Addendum"). The Draft Addendum project was the same as the 2000 MND project, except that the Findings Requirement was removed. Removal of the Findings Requirement would have made CPVC pipe accessible to all Californians as a plumbing material alternative. A number of comments were submitted regarding the Draft Addendum, many of which supported the Draft Addendum. Some of the comments, however, argued that an addendum was not an appropriate CEQA document to use in this situation on the basis that the proposed action was an entirely different project than the action analyzed in the 2000 MND and thus a full EIR analyzing the impacts of the "new" project was required. The Lead Agency considered this and the other comments on the Draft Addendum and decided that the public would be better served by an EIR that would provide a more in-depth analysis of the potential impacts of the removal of the Findings Requirement.

The Lead Agency does not agree that the Draft Addendum project was a totally "new" project. Both projects were for CPVC pipe use in residential potable water distribution. Both projects required the same mitigation measures. The Draft Addendum project only differed from the 2000 MND project in its removal of the Findings Requirement. While it is true that removal of the Findings Requirement could lead to increased CPVC use, it would have no effect on the impacts associated with individual applications. Removal of the Findings Requirement does not increase the impacts on potable water quality, worker safety (on a single-installation basis), or the risk of fire-associated impacts.

The Draft Addendum was also criticized for using estimates and assumptions. However, such methods are unavoidable for this type of project. This is not a typical

[6] See CEQA document, State Clearing House No. 2000091089.

CEQA project where a specific, discrete action will be taken and where the impacts are known with a reasonable degree of certainty. Rather, this project involves a change in a regulation. By itself, this will cause no direct impacts to the environment. However, it may cause indirect changes in the environment when others act on that regulation. Accordingly, estimates and assumptions are necessary because of the number of uncertain variables. It is not possible to predict exactly how many houses will be built with CPVC plumbing; where or when they will be built; how big they will be; what exact number of plumbing fixtures will be used; what type of cement the plumber will use; how much cement and primer will be used; what the temperature, humidity and barometric pressure will be on the day the installation is done; or any number of other factors that affect the environmental impacts of CPVC pipe use.

This current EIR is a Subsequent EIR to the 2000 MND prepared pursuant to CEQA Guidelines Section 15162. Thus, this EIR evaluates the proposed change to the existing California Plumbing Code regulation regarding the use of CPVC for residential plumbing systems and the impact of that change. As such, this EIR will not repeat the review of impacts that remain the same as those addressed in the 2000 MND. It does not evaluate whether or not CPVC should be allowed in California in the first instance in residential structures, because such use of CPVC is already allowed throughout the state, provided that the required finding is made. This EIR does evaluate the potential increase in the use of CPVC if the Finding Requirement is deleted. With respect to all other impacts and all other information, the analysis of the 2000 MND continues to apply and is incorporated into this EIR. The 2000 MND is available and can be reviewed by the public upon request at the Department of Housing and Community Development, 1800 3rd Street, Room 440, Sacramento, CA 95814.

3.4 Project objectives

The following objectives for the Proposed Project were identified by the Lead Agency:

- The current Uniform Plumbing Code permits the unrestricted use of CPVC pipe for hot and cold water distribution within residential buildings. The current California Plumbing Code conditions the use of CPVC to those situations where the local building official makes a finding that there is or will be a premature failure of metallic pipe due to existing water or soil conditions (referred to as the “Findings Requirement”). The project objective is to remove the “Findings Requirement” from the California Plumbing Code thereby allowing unconditional use of CPVC throughout California as an alternative pipe material for residential potable water plumbing systems.

3.5 Description of the Proposed Project

The Project is the amendment of regulations (i.e., building standards) pertaining to the use of CPVC pipe for potable water piping in buildings under the jurisdiction of the Lead Agency which include: hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including accessory buildings, facilities, and uses thereto; as well as permanent buildings, and permanent accessory buildings or structures, constructed within mobilehome parks and special occupancy parks that are under the control and ownership of the park operator.

In this EIR, the terms “CPVC” and “CPVC pipe” refer to chlorinated polyvinyl chloride pipe, fittings, and the materials used to join CPVC pipe and fittings, unless the context clearly indicates otherwise. The part of the plumbing system being affected by this project would include the cold and hot water piping system within residential buildings. These regulations, if approved, would become part of the California Plumbing Code, which is a segment of the California Building Standards Code. The California Building Standards Commission is responsible for final adoption of the California Building Standards Code. The California Building Standards Commission receives proposed codes from a number of public agencies which have statutory authority to propose codes for various types of occupancies. The code provisions related to potable water piping in residential buildings are the responsibility of the Lead Agency.

The modifications to the existing plumbing code would entail removing the current requirement that a building official make a finding that there was or will be a premature failure of metallic pipe because of corrosive water and/or soil conditions (referred to as the “Findings Requirement”) prior to allowing CPVC to be used for potable water piping in residential structures. The express terms of the proposed code change appear at the end of this chapter in section H.

3.5.1 Proposed Code Changes

Chapter 6: Water Supply and Distribution and Appendix I: Installation Standards require text amendment to allow for the removal of the “findings” requirement. These proposed text changes are presented below:

CPVC RELATED EXPRESS TERMS FOR PROPOSED BUILDING STANDARDS OF THE DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT REGARDING THE ADOPTION BY REFERENCE OF THE 2006 EDITION OF THE UNIFORM PLUMBING CODE (UPC) WITH PROPOSED AMENDMENTS INTO THE 2007 CALIFORNIA PLUMBING CODE (CPC) CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 5

LEGEND FOR EXPRESS TERMS:
Existing California amendments or code language being modified: All such language appears in *italics*; modified language is underlined or shown in ~~strikeout~~.

New UPC language with new California amendments: UPC language shown in normal point; California amendments to UPC text shown *underlined and in italics*.

3. Repealed text: All such language appears in ~~strikeout.~~

4. Notation: Authority and Reference citations are provided at the end of each chapter.

CHAPTER 6
Water Supply and Distribution

~~***604.1.1 [For HCD 1 & HCD 2]*** *Water distribution pipe, building supply water pipe and fittings shall be of brass, copper, cast iron, galvanized malleable iron, galvanized wrought iron, galvanized steel, or other approved materials. Asbestos-cement, CPVC, PE or PVC, water pipe manufactured to recognized standards may be used for cold water distribution systems outside a building except as provided for CPVC use pursuant to Section 604.1.2. All materials used in the water supply system, except valves and similar devices shall be of a like material, except where other wise approved by the Administrative Authority.*~~

Section 604.1.1~~2~~ ~~[HCD 1]~~ Local Authority to Approve CPVC Pipe Within Residential Buildings Under Specified Conditions

For applications listed in 108.2.1.1 ~~through 108.2.1.3~~ regulated by the Department of Housing and Community Development, ~~T~~ the local responsible building official of any city, county, or city and county, in accordance with the procedures set forth in Chapter 3, ~~(with the exception of Section 301.2.7)~~ ~~may~~ shall authorize by permit the use of CPVC for hot and cold water distribution systems within the interior of residential buildings provided all of the following conditions are satisfied:

~~***(a) Finding Required.*** *The building official shall first make a determination that there is or will be the premature failure of metallic pipe if installed in such residential buildings due to existing water or soil conditions.*~~

(a)~~(b)~~ Permit Conditions. *Any building permit issued pursuant to ~~this~~ Section 604.1.1 shall be conditioned on compliance with the mitigation measures set forth in this Section.*

(b)~~(c)~~ Approved Materials. *Only CPVC plumbing material listed as an approved material ~~in~~, and installed in accordance with this code may be used.*

***(c)~~(d)~~* Installation and Use.** *Any installation and use of CPVC plumbing material pursuant to this Section shall comply with all applicable requirements of this code and Section 1.2 of Appendix I of this code, Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distributions Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

***(d)~~(e)~~* Certification of Compliance.** *Prior to issuing a building permit pursuant to ~~this~~ Section 604.1.1, the building official shall require as part of the permitting process that the contractor, or the appropriate plumbing subcontractors, provide written certification: (1) that is required in subdivision (e)~~(f)~~; and (2) that he or she will comply with the flushing procedures and worker safety measures set forth in Section 1.2 of Appendix I of this code, Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

***(e)~~(f)~~* Worker Safety.** *Any contractor applying for a building permit that includes the use of CPVC plumbing materials authorized pursuant to this Section shall include in the permit application a signed written certification stating that~~:~~;*
(1) They are aware of the health and safety hazards associated with CPVC plumbing installations.
(2) They have included in their Illness and Injury Prevention Plan the hazards associated with CPVC plumbing pipe installations; and
(3) The worker safety training elements of their Injury and Illness Prevention Plan meet~~s~~ the Department of Industrial Relations' guidelines.

***(f)~~(g)~~* Findings of Compliance.** *The building official shall not give final permit approval of any CPVC plumbing materials installed pursuant to ~~this~~ Section 604.1.1 unless he or she finds that the material has been installed in compliance with the requirements of this code and that the installer has complied with the requirements in Section ~~301.0.1~~ 1.2.1, of Appendix I of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

***(g)~~(h)~~* Penalties.** *Any contractor or subcontractor found to have failed to comply with the ventilation, glove or flushing requirements of Section ~~301.0~~ 1.2.2 of Appendix I of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005 shall be subject to the penalties in Health and Safety Code, Division 13, Part 1.5, Chapter 6 (Section 17995 et seq.). In addition, if during the conduct of any building inspection the building official finds that the ventilation and glove requirements of Section ~~301.0~~ 1.2.2 of Appendix I of this code, "Special Requirements for CPVC Installation within Residential Buildings", are being violated, such building~~s~~ officials shall cite the contractor or subcontractor for that violation.*

APPENDIX I
INSTALLATION STANDARDS

Adopt entire Appendix I as amended.

INSTALLATION STANDARD
FOR
CPVC SOLVENT CEMENTED HOT AND COLD WATER DISTRIBUTION SYSTEMS
IAPMO IS 20-~~2003~~ 2005

~~Section 301.0 Special Requirements for CPVC Installation Within Residential Buildings Only. [HCD 1]~~

1.2 Special Requirements for CPVC Installation within Residential Structures.

In addition to the other requirements in the California Plumbing Code and this Appendix for the ~~Installation Standards for~~ installation of CPVC Solvent Cemented Hot and Cold Water Distributions Systems, all installations of CPVC pipe within residential structures shall meet the following:

~~301.0.1~~ 1.2.1 Flushing Procedures. ~~301.0.1.1~~ *All installations of CPVC pipe within residential structures shall be flushed twice over a period of at least one (1) week. The pipe system shall be first flushed for at least 10 minutes and then filled and allowed to stand for no less than 1 week, after which all the branches of the pipe system must be flushed long enough to fully empty the contained volume. At the time of the fill, each fixture shall have a removable tag applied stating:*

"This new plumbing system was first filled on (date) by (name). The California Department of Housing and Community Development requires that the system be flushed after standing at least one week after the fill date specified above. If the system is used earlier than one week after the fill date, the water must be allowed to run for at least two minutes prior to use for human consumption. This tag may not be removed prior to flushing, except by the homeowner."

~~301.0.2~~ 1.2.2 Worker Safety Measures. ~~301.0.2.1~~ *Mechanical ventilation sufficient to maintain exposures below the relevant exposure limits established by state regulations shall be provided in enclosed spaces. This ventilation shall be directed at the breathing zone of the worker installing the pipe. Where mechanical ventilation is not practical, respirators, suitable for organic vapors, shall be used. For the purpose of this subdivision, an~~d~~ enclosed space is defined as:*
(a) A space less than 100 square feet of floor area under a ceiling with a height of 10 feet or less, and which does not have openings (consisting of doors, windows, or unfinished walls) on at least two sides;
(b) Crawl spaces having a height of less than three feet;
(c) Enclosed attics that have a roof and ceiling; or
(d) Trenches having a depth greater than ~~twenty-four~~ 24 inches.

~~301.0.2.2~~ *Installers of ~~CPCC~~ CPVC pipe within residential structures shall use non-latex thin gauge (4 millimeters) nitrile gloves, or other gloves providing an equivalent or* *better degree of protection during the installation of the CPVC plumbing system. Gloves shall be provided to all workers by the contractor, or plumbing subcontractor, and shall be replaced upon contamination by cements.*

3.5.2 Current and Future Use of CPVC

If the proposed regulations are adopted, increased use of CPVC pipe is anticipated in residential buildings throughout the state. The other plumbing materials, such as copper pipe, that are currently permitted would continue to be allowed. CPVC pipe is also already used in California for potable water pipe and other applications (having been permitted by past legislation as well as by local building officials who have made findings pursuant to the Findings Requirement). The current estimated percent use of CPVC pipe in California is 13%, while copper pipe makes up an estimated 53.5% of existing water pipe use, and 33.5% is attributed to all other materials.[7] The net effect of adoption of the proposed regulations would probably be an increase in the use of CPVC for potable water conveyance, with a proportionate decrease in the use of other materials.

There is little published data on the extent of CPVC pipe use in California. Currently, CPVC is approved for potable water use in California in mobilehomes, recreational vehicles, commercial modulars, and manufactured homes; and certain jurisdictions have allowed residential CPVC use under Health and Safety Code section 17921.9 prior to its repeal, or pursuant to the Findings Requirement. CPVC pipe also is permitted for residential potable water distribution in the other 49 states. Because there are no permitting or reporting requirements associated with CPVC installation or use, there is no readily accessible regulatory database to document the extent of CPVC use, or the use of other potable water materials. In order to estimate future use of CPVC in California, the Lead Agency requested, and has relied on, data provided by a manufacturer of CPVC resin.

Any projection of possible future conditions, such as the extent of future CPVC use, necessarily entails some degree of speculation, but it is reasonable to assume that if the use of CPVC pipe for potable water piping in residential buildings is approved, then the extent of use in California will be similar to that in places where CPVC is already

[7] This estimate is based on an average of California aggregate data for 2004 and 2005 obtained from the NAHB Research Center, a subsidiary of the National Association of Home Builders (NAHB). The Research Center's California aggregate data includes Hawaii, but the number of new homes built during these years in Hawaii are not significant. The Research Center's 2004 data for California show that copper accounted for 62% of the market share, CPVC accounted for 13% of market share, and other materials accounted for 25% of market share. The Research Center's 2005 data for California indicate that copper accounted for 45% of market share, CPVC accounted for 13% of market share, and other materials accounted for 38% of market share.

approved. For the United States and Canada, the residential potable water plumbing market (one half to two-inch diameter pipe) is approximately divided as follows: 30 percent CPVC; 53 percent copper; and 17 percent all other materials.[8] California contributes to these statistics, but CPVC has a lower market share in California than it otherwise would have since the Findings Requirement is currently in place. For this reason, a calculation based on weighted average has been used, as explained in more detail in Section 4.2.4 of this RDEIR, resulting in an estimate that CPVC has a 32 percent market share in the other 49 states. While it is difficult to project future use, if California follows a similar pattern of usage, then CPVC could account for about 32 percent of the potable water pipe sold in the state.

Estimating future residential development is very difficult based on the effects of market conditions to this industry. The effects of external factors such as interest rates, job market, economic outlook, cost of various commodities such as copper, oil, building materials, etc. have such a profound effect on the building industry that estimating residential development from quarter to quarter becomes a questionable practice – much less year over year estimates. In estimating the effect of the Project on the environment, we must not only estimate the percent change in the use of the CPVC material, but we must also estimate the increase/decrease of residential development. A statistical approach has been used to estimate future home construction based on both long-term and short-term housing permitting trends, based on the average number of housing permits issued over the last 3 years (2003-2005) and over the last 39 years (1967-2005) for each California county. The methodology and estimates resulting from this statistical approach are set forth in detail in Section 4.2.4 of this RDEIR.

It also is necessary to estimate the increase in the amount of CPVC adhesives, used to join CPVC pipe that would be used if the Project were approved. The Lead Agency has determined that when using both cement and primer, the amount of adhesives used for a single-family residential unit would be 0.270 L of primer and 0.810 L of cement, and a multifamily residential unit would use 0.110 L of primer and 0.420 L of cement. The Lead Agency has also determined that when one-step cement, which does not require the use of primer, is used, the average single-family residential unit would require 0.810

[8] E-mail from Jeff Cash, Business Director, Americas Plumbing, Noveon, February 23, 2006, (Doc.220). These estimates are based on an average of national aggregate data for 2004 and 2005 obtained from the NAHB Research Center, a subsidiary of the National Association of Home Builders (NAHB). The Research Center's aggregate national data for the year 2004 showed that CPVC accounted for 24% of the market share, copper accounted for 60%, and other materials accounted for 16%. The Research Center's 2005 aggregate national data showed that CPVC accounted for 27% of the market share, copper accounted for 42%, and other materials accounted for 31%. Thus, CPVC accounted for an average of 25.5% of the national market share. The national average of CPVC market share for these two years has been rounded up to 30 percent in order to provide a more conservative estimate.

L and the average multifamily unit would require 420 L of one-step cement. Section 4.2.4 of this RDEIR explains the methodology that has been used to arrive at these estimates.

Of course, it is impossible to arrive at precise estimates regarding the physical quantities of CPVC and CPVC adhesives that will be used in the future, as these amounts will vary according to the percent of the relevant market captured by CPVC, the number of residential buildings constructed, the size and other design parameters of the buildings using CPVC, as well as many other factors, all of which will likely vary over time.

3.6 Regulatory Requirements, Permits, and Approvals

3.6.1 California Buildings Standards Commission

If, based on a certified Final EIR, the Lead Agency determines that it is appropriate to recommend this modification of the California Plumbing Code; the certified Final EIR will be forwarded to the California Building Standards Commission for consideration. The California Building Standards Commission is a Responsible Agency, and it may rely on the certified Final EIR for subsequent approval of the recommended changes to the California Plumbing Code stated in Section 3.5.1 of this EIR.

Chapter 4.0

ENVIRONMENTAL ANALYSIS

4.1. Introduction to Environmental Analysis

This chapter contains an analysis of each issue that has been identified through preliminary environmental analysis and the public scoping session for the Project and, as such, constitutes the major portion of the Recirculated Draft EIR. As explained in Section 3.3.1, this EIR is a Subsequent EIR to the 2000 Mitigated Negative Declaration and, as such, this EIR does not repeat the review of impacts that remain the same as those addressed in the 2000 MND. Sections 4.2 through 4.5 of this EIR describe the environmental setting of the project as it relates to each specific issue, the impacts resulting from implementation of the project, and mitigation measures that would reduce impacts of the project.

4.1.1 Scope of the Environmental Impact Report

The following topics are addressed in this chapter:

1. Air Quality
2. Water Quality
3. Worker Safety
4. Solid Waste

Preliminary analysis determined that the project would not result in significant impacts, or in new significant impacts that were not previously analyzed in the 2000 MND, to land use consistency, transportation and circulation, population and housing, geology and soils, agricultural resources, noise, biological resources, drainage and hydrology, hazards and hazardous materials, cultural resources, aesthetics, recreation, mineral resources, and energy.

4.1.2 Significance of Environmental Impacts

Under CEQA, a significant effect is defined as a substantial, or potentially substantial, adverse change in the environment. The CEQA Guidelines require this determination to be based on scientific and factual data. Each impact and mitigation measure of this chapter is prefaced by a summary of thresholds of significance, which are the criteria for determining whether an impact is considered potentially significant. These criteria have been developed using Appendix G of the CEQA Guidelines and applicable regulatory standards.

4.1.3 Mitigation Measures

As required by CEQA, mitigation measures are set forth and described for all significant or potentially significant impacts identified in this EIR. The mitigation measures are designed to minimize, reduce, or avoid the identified environmental impact or to rectify or compensate for that impact. CEQA does not require mitigation measures to be set forth and described for those impacts that are determined to be less than significant. In the case of this EIR, several impacts have been identified as less than significant. In some cases, the Lead Agency has determined that certain impacts are less than significant in part due to the already existing mitigation measures that were incorporated into Section 301.0 of Appendix I, Installation Standards, California Plumbing Code as part of the project analyzed in the 2000 MND.

4.1.4 Cumulative Impacts

The CEQA Guidelines require that an EIR must discuss cumulative impacts if the project's incremental effect combined with the effects of other projects is "cumulatively considerable." (CEQA Guidelines § 15130(a)). This determination is based on an assessment of the project's incremental effects "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probably future projects." (CEQA Guidelines § 15064(b)(1)). Cumulative impacts related to the Proposed Project are discussed and analyzed in Section 6.2.2 of this EIR.

4.1.5 Unavoidable Significant Impacts

CEQA requires that an EIR describe any significant environmental effects that cannot be avoided if the project is implemented. These may include significant effects that cannot be mitigated as well as effects that can be mitigated but not reduced to a level of insignificance. The proposed Project will result in significant and unavoidable air quality impacts which are described in Section 4.2 of this chapter, and significant and unavoidable cumulative air quality impacts which are described in Section 6.2.2 (Cumulative Impacts) of this EIR. Section 6.3 of this EIR also discusses these Significant Unavoidable Adverse Impacts.

4.1.6 Format of Issue Sections

Each environmental issue section has four parts: 1) Environmental Setting, 2) Regulatory Setting, 3) Thresholds of Significance, and 4) Impacts and Mitigation Measures. Impacts are numbered and shown in bold type, and, where applicable, the corresponding mitigation measures are numbered and indented. Impacts and mitigation measures are numbered consecutively within each topic.

4.2 Air Quality

This section describes existing air quality in California, the processes that affect air quality, and the regulatory framework under which air pollutant emissions are controlled. This section also evaluates the potential effects of the Project on local and regional air quality.

The installation and repair of CPVC pipe requires either the use of one-step cement (no primer needed) or cement and a primer (collectively "**Adhesives**"). There are potential significant environmental impacts related to evaporation of solvents from Adhesives. Areas of concern include exposure of pipe installers to Adhesives and the effect that evaporated solvents might have as ozone precursors. Pipe worker exposure is discussed in Chapter 4.4: Worker Safety.

4.2.1 Air Quality Setting

ENVIRONMENTAL SETTING

California's climate varies from Mediterranean, to steppe, to alpine, to desert. The Cascade and Sierra Nevada Ranges act as barriers to the passage of air masses. Because of these barriers, and California's western border of the Pacific Ocean, summer weather in portions of the State is generally milder than the rest of the country and is characterized by dry, sunny conditions with infrequent rainfall. In winter, the same mountain ranges prevent cold, dry air masses from moving into the State from the central areas of the United States. Consequently, winters in California are also milder than would be expected at these latitudes. The mountains also tend to trap air and limit pollutant dispersion.

Ambient air quality in a given area depends on the quantities of pollutants emitted within the area, transport of pollutants to and from surrounding areas, local and regional meteorological conditions, as well as the surrounding topography of the area. Air quality is described by the concentration of various pollutants in the atmosphere. Units of concentration are generally expressed in parts per million (**ppm**) or micrograms per cubic meter (**μg/m^3**). Air basins monitor criteria pollutants continuously at stations located throughout their respective jurisdictions.

CRITERIA POLLUTANTS

The federal and state governments have established ambient air quality standards for six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur oxides (SO_2), particulate matter (including PM10 and PM2.5), and lead (Pb) (Table 4.2-1). O_3 and NO_2 are generally considered regional pollutants because these pollutants or their precursors affect air quality on a regional scale. Pollutants such as CO, SO_2, and lead are considered local pollutants that tend to accumulate in the air locally. Particulate matter is considered a local and regional pollutant.

The Project would not increase emissions of lead, nitrogen oxides, sulfur oxides, carbon monoxide or particulate matter. The following analysis focuses on the Project's potential to increase emissions of reactive organic gases (ROGs). ROG is not a criteria pollutant and ambient standards have not been developed for this class of pollutants. However, ROG emissions combine with NOx to form ozone, which is a criteria pollutant. In addition, ROG represents a class of pollutants whose constituents are considered toxic air contaminants (TACs) that can pose health risks. For these reasons, the following analysis focuses on ROG emissions as they contribute to ozone formation and TAC health risks. Brief descriptions of these pollutants follow.

Reactive Organic Gases and Volatile Organic Compounds

Hydrocarbons are organic gases that are formed solely of hydrogen and carbon. There are several subsets of organic gases including Volatile Organic Compounds (VOCs) and Reactive Organic Gases (ROGs). Both VOCs and ROGs are emitted from incomplete combustion of hydrocarbons or other carbon-based fuels. Combustion engine exhaust, oil refineries, and oil-fueled power plants are the primary sources of hydrocarbons. ROG and nitrogen oxides (NOx) are emitted primarily by mobile sources and stationary combustion equipment. Another source of hydrocarbons is evaporation from petroleum fuels, solvents, dry cleaning solutions, paint, primer and cement (as it relates to the installation of CPVC piping).

The primary health effects of hydrocarbons result from the formation of ozone and its related health effects (see ozone health effects discussion below). High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. There are no separate federal or California ambient air quality standards for ROG. Carcinogenic forms of ROG are considered toxic air contaminants (TACs). An example is benzene, which is a carcinogen.

CPVC Adhesives contain the following VOCs: acetone, tetrahydrofuran, methyl ethyl ketone, and cyclohexanone. VOCs readily evaporate, but do not necessarily react with other chemicals to form ozone. For example, although acetone is a VOC, it is not considered an ROG because it has a low reactivity with other compounds (ARB, 2006). In contrast, tetrahydrofuran, methyl ethyl ketone, and cyclohexanone are regulated as ozone precursors because they are VOCs that are highly reactive with other chemicals and thus contribute to smog. The Air Resources Board (**ARB**) uses the terms "ROG" and "VOC" almost interchangeably.

Nitrogen Oxides

Nitrogen oxides (NOx) are a family of highly reactive gases that are a primary precursor to the formation of ground-level ozone, and react with ROGs in the atmosphere to form acid rain. NOx is emitted from combustion processes in which fuel is burned at high temperatures, principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. A brownish gas, nitrogen dioxide is a strong oxidizing agent that reacts in the air to form corrosive nitric acid, as well as toxic organic nitrates.

Ozone Health Effects

O_3 is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections, and can cause substantial damage to vegetation and other materials. O_3 is a severe eye, nose, and throat irritant. O_3 also attacks synthetic rubber, textiles, plants, and other materials and causes extensive damage to plants by leaf discoloration and cell damage. O_3 is not emitted directly into the air; it is formed by a photochemical reaction in the atmosphere. O_3 precursors—reactive organic gases (ROGs) and oxides of nitrogen (NO_X)—react in the atmosphere in the presence of sunlight to form O_3. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, O_3 is primarily a summer problem.

Emissions Related to Currently Used Pipe Materials for Residential Potable water Systems

The current market share of CPVC and other residential plumbing materials establish the context for the existing environmental setting related to air quality, i.e., the baseline against which potential air quality impacts of the proposed Project are to be compared. As explained in Section 3.5.2 of this Recirculated Draft EIR, the estimated current market share of CPVC pipe in California (subject to the Findings Requirement) is 13%, with copper pipe making up an estimated 53.5% of existing water pipe use and 33.5% attributed to all other materials.

During soldering, toxic and carcinogenic smokes and vapors are produced and released into the atmosphere.[9] A recent study measured organic vapors generated during soldering of copper pipes when using “water soluble flux” and “water soluble tinning flux.”[10] The tests were conducted according to procedures found in the American Industrial Hygiene Association Journal, July 1990 article “Identification of Organic

[9] Nikora, J., Olson, A., & Steele, W., *Identification of Organic Vapors from Commercially Available Soldering Fluxes During Simulated Soldering of Copper Plumbing Systems*, American Industrial Hygiene Ass’n Journal, Vol. 51, No. 7, pp. 476-77 (July 1990).

[10] Research Triangle Park Laboratories, Inc., Flux Tests; PO Number: PD 01-03735, (Sept. 26-27, 2006).

Vapors from Commercially Available Soldering Fluxes During Simulated Soldering of Copper Plumbing Systems."[11] The full results of the study are presented in Appendix D and summarized in Table 4.4-1, located in Section 4.4 of this RDEIR.

This study demonstrated that numerous toxic organic vapors are generated during the copper pipe soldering process, including the following chemicals that are present on the California Air Resource Board's Toxic Air Contaminant Identification List[12]: chlormethane; vinyl chloride; chloroethane; carbon disulfide; isopropyl alcohol; methlyene chloride; hexane; vinyl acetate; 2-butanone; benzene; 1,2 dichlorethane; trichloroethylene; 1,4-dioxane; toluene; 4-methyl-2-pentanone (MIBK); tetrachlorethylene; ethyl benzene; chlorobenzene; m/p-xylene; o-xylene; styrene; and benzyl chloride. These vapors are released into the atmosphere and can contribute to air quality impacts. While the amount of these chemicals emitted during the copper pipe soldering process cannot be quantified from this study, it provides a qualitative view of potential air quality emissions from copper pipe installation. Furthermore, the study identified particles less than 10 microns in size that were emitted into the air but not accounted for in the tests.[13] As has been shown, particulates below 10 microns in diameter have a greater chance to enter the respiratory system, and particles below 5 microns in diameter are more apt to reach the deep lung or alveolar spaces.[14] In healthy lungs, particles from 5 to 10 microns in diameter are generally removed from the respiratory system by a constant cleansing action that takes place in the upper respiratory tract. However, with excessive "dust" exposures or a diseased respiratory system, the efficiency of the cleansing action can be significantly reduced.[15]

Toxic Air Contaminants

TACs are pollutants that may be expected to result in an increase in mortality or serious illness, or that may pose a present or potential hazard to human health. Health effects of TACs include cancer, birth defects, neurological damage, damage to the body's natural defense system, and diseases that lead to death. The ARB has identified diesel exhaust particulate matter as a TAC.

[11] Research Triangle Park Laboratories, Inc., at p. 1.

[12] CARB, California Air Resources Board, Toxic Air Contaminant (TAC) Identification List, Category IIa substances (Dec. 1999), available at http://www.arb.ca.gov/toxics/cattable.htm#Note%201 (last accessed Nov. 2, 2006).

[13] Research Triangle Park Laboratories, Inc., at p. 1.

[14] MSA, *Key Elements of a Sound Respiratory Protection Program*, at p. 3 (Apr. 2004), available at http://media.msanet.com/NA/USA/APR/ConventionallyMaintainedRespirators/ComfoClassicHalfMaskRespirators/1000-61KeyElementsResp.pdf.

[15] MSA, *Key Elements of a Sound Respiratory Protection Program*, at pp. 3-4.

4.2.2 Regulatory Setting

California is divided into 58 counties, 35 air districts, and 15 air basins (see Figures A-1, A-2, and A-3). The confluence of basins, districts, and counties makes it difficult to describe California's air quality or air quality standards in a general manner. Air district and basin boundaries do not follow political boundaries. It is possible for one county to be in two air districts and two air basins. Air basins generally have similar geographic and meteorological features, and air basins are often referred to when discussing air quality. However, it is the air districts that adopt control regulations.

California and the federal government have established standards for several different pollutants. For some pollutants, separate standards have been set for different measurement periods. Most standards have been set to protect public health, but for some pollutants, standards have been based on other values (e.g., protection of crops, protection of materials, or avoidance of nuisance conditions). The state and federal standards for a variety of pollutants are shown in Table 4.2-1.

FEDERAL REGULATIONS

The federal Clean Air Act (CAA), promulgated in 1970 and amended twice thereafter, establishes the framework for modern air pollution control. The CAA directs the U.S. EPA to establish ambient air quality standards for six criteria pollutants: ozone (O_3), carbon monoxide (CO), lead, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and inhalable particulate matter 2.5 and 10 microns or less in diameter (PM 2.5 and PM10, respectively). The standards are divided into primary and secondary standards; the former are set to protect human health within an adequate margin of safety and the latter to protect environmental values, such as plant and animal life.

The primary legislation that governs federal air quality regulations is the CAA Amendments of 1990, which delegate primary responsibility for clean air to the EPA. The EPA develops rules and regulations to preserve and improve air quality, as well as delegating specific responsibilities to state and local agencies.

STATE REGULATIONS

Responsibility for achieving California's standards, which are more stringent than federal standards, is placed on the California Air Resources Board (ARB) and local air districts. These standards are to be achieved through district-level air quality management plans that will be incorporated into California's state implementation plan (SIP). In California, the EPA has delegated authority to prepare SIPs to the ARB, which in turn has delegated that authority to individual air districts.

The ARB traditionally has established California ambient air quality standards (CAAQS), maintained oversight authority in air quality planning, developed programs for reducing emissions from motor vehicles, developed air pollutant emission inventories, collected air quality and meteorological data, and approved SIPs.

The responsibilities of local air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required under CEQA.

The California Clean Air Act (CCAA) of 1988 substantially added to the authority and responsibilities of air districts. It designates air districts as lead air quality planning agencies, requires them to prepare air quality plans, and grants them authority to implement transportation control measures. The CCAA focuses on attainment of the CAAQS, which for certain pollutants and averaging periods are more stringent than the comparable national ambient air quality standards(NAAQS) established by the federal government.

The CCAA requires designation of attainment and nonattainment areas with respect to CAAQS. It also requires local and regional air districts to expeditiously adopt and prepare an air quality attainment plan if they violate CAAQS for CO, SO_2, NO_2, or O_3. These plans are specifically designed to attain these standards and must be designed to achieve an annual 5% reduction in district-wide emissions of each nonattainment pollutant or its precursors. No locally prepared attainment plans are required for areas that violate the state PM10 standards.

The CCAA requires that the CAAQS be met as expeditiously as practicable. Unlike the federal CAA, however, it does not set precise attainment deadlines. Instead, it establishes increasingly stringent requirements for areas that will require more time to achieve the standards.

State Attainment Designations

The California ARB is charged with the responsibility of adopting standards of ambient air quality for each air basin in consideration of the public health, safety, and welfare. The ARB has adopted State ambient air quality standards. The California Clean Air Act requires the ARB to establish designation criteria, which provide the basis for designating areas of California as attainment, nonattainment, nonattainment-transitional, or unclassified with respect to the State standards.

The ARB originally adopted designation criteria in 1989 and has modified them several times since then, the last time in January 2004. The area designations reflect the most current and complete ambient air quality data, collected during 2001 through 2003. The CCAA requires the ARB to establish and annually review area status based on designation criteria. During the annual review, the ARB determines whether changes to the existing area designations are warranted, based on an evaluation of recent air quality data.

The ARB makes area designations for ten pollutants: ozone, suspended particulate matter (PM10), fine suspended particulate matter (PM2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles. As ozone is the pollutant of greatest concern for the Project, out attainment discussion will focus on ozone attainment.

STATE CRITERIA FOR DESIGNATING AN AREA AS NONATTAINMENT FOR OZONE

The ARB will designate an area as nonattainment for ozone if:

1. Monitoring reveals at least one violation of a state standard for ozone in the area, and the measurement of the violation meets the representative criteria; or

2. Limited or no air quality data were collected in the area, but the ARB finds, based on meteorology, topography, and air quality data for an adjacent nonattainment area, that there has been at least one violation of a state standard for ozone in the area being designated. (ARB Attainment, 2006).

STATE REQUIREMENTS FOR DESIGNATING AN AREA AS NONATTAINMENT-TRANSITIONAL FOR OZONE

If an area within an air basin is designated as nonattainment for ozone, that area is designated as nonattainment-transitional for ozone if the following conditions are met:

1. The area is an entire district within an air basin;

2. Monitoring data are used to determine the number of exceedances for the previous calendar year at each monitoring location in the area;

3. All data collected during the previous calendar year are considered in the evaluation, including data possibly affected by a highly irregular or infrequent event;

4. Each day with concentration(s) that exceed the state ozone standard is counted as one exceedance day; and

5. No monitoring location in the area has more than three exceedance days during the previous calendar year.

CRITERIA FOR DESIGNATING AN AREA AS ATTAINMENT FOR OZONE

The ARB will designate an area as attainment for ozone if:

1. Monitoring data show that no state standard for ozone was violated at any site in the area;

2. Monitoring data meet representative and completeness criteria for a location at which the pollutant concentrations are expected to be high based on the spatial distribution of emission sources in the area and the relationship of emissions to air quality.

3.

CRITERIA FOR DESIGNATING AN AREA AS UNCLASSIFIED FOR OZONE

The ARB will designate an area as unclassified for ozone if it finds that the data do not support a designation of attainment or nonattainment.

CURRENT STATE OZONE ATTAINMENT STATUS BY AIR BASIN

Of the 15 air basins in California, only 4 are currently designated as in attainment for ozone: North Coast, Northeast Plateau, Lake County and Lake Tahoe. San Luis Obispo County, located in the South Central Coast Air Basin, is designated as in attainment for ozone; however, the remainder of the South Central Coast Air Basin is in nonattainment. Table 4.2-2 summarizes the current State attainment designations for ozone by air basin. The same information is depicted graphically in Figure B-1.

Table 4.2-2. State Designations for Ozone By Air Basin

State Air Basin Designations for Ozone	
Air Basin	**Designation**
North Coast Air Basin	Attainment
San Francisco Bay Area Air Basin	Nonattainment
North Central Coast Air Basin	Nonattainment-Transitional
South Central Coast Air Basin:	
San Luis Obispo County	Attainment
Remainder of Air Basin	Nonattainment
South Coast Air Basin	Nonattainment
San Diego Air Basin	Nonattainment
Northeast Plateau Air Basin	Attainment
Sacramento Valley Air Basin:	
Colusa County	Nonattainment-Transitional
Glenn County	Nonattainment-Transitional
Remainder of Air Basin	Nonattainment
San Joaquin Valley Air Basin	Nonattainment
Great Basin Valleys Air Basin:	
Alpine County	Unclassified
Inyo County	Unclassified
Mono County	Nonattainment
Mojave Desert Air Basin	Nonattainment
Salton Sea Air Basin	Nonattainment
Mountain Counties Air Basin:	
Amador, Calaveras, El Dorado, Nevada, Placer, Mariposa, and Tuolumne Counties	Nonattainment
Plumas and Sierra Counties	Unclassified
Lake County Air Basin	Attainment
Lake Tahoe Air Basin	Attainment

Federal Attainment Designations

The U.S. EPA established a new eight-hour ozone standard in July 1997, and designated areas as nonattainment for the eight-hour standard in April 2004. The list of California counties designated as nonattainment for the federal eight-hour ozone standard is set forth in Figure B-3.

4.2.3 Thresholds of Significance

One method of determining the significance of pollutant emissions is to compare the estimated pollutant concentration to an appropriate state or federal ambient air quality standard (see Table 4.2-1). These standards represent the allowable pollutant concentrations, and are set to ensure that the public health and safety are protected, while including a reasonable margin of safety to protect the more sensitive individuals in the population.

Some, but not all, of the local air districts have developed CEQA guidelines that establish significance thresholds for evaluating new projects and their air quality impacts. Significance thresholds for project-related emissions typically are divided into construction and operational values. Construction values generally are for short-term emissions that occur during the construction of a project. Operational emissions occur after construction is completed and structures are occupied. Operational values are generally for land use development projects that would result in permanent year-round (365 days), long-term emissions.

The proposed Project is a code change, rather than a typical site-specific, “bricks and mortar” project, and does not have the construction or operation characteristics of a typical CEQA project. VOCs emitted during each individual residential construction project that uses CPVC pipe for potable water systems will be short-term in nature, similar to type of impact that typically is evaluated using construction thresholds. However, at any given time, different individual residential construction projects throughout different areas of the state could be emitting VOCs due to the use of CPVC pipe due to the proposed code change. Thus, the Project would also result in long-term emissions of VOCs, in a manner more similar to the type of impact typically evaluated using operation, as opposed to construction, thresholds. For this reason, this analysis considered both the construction and operation threshold for each air district and applied the most restrictive (i.e., the most conservative) of the two thresholds.

If an air district has established CEQA thresholds, the projected amount of VOC emissions were compared to the most stringent of the construction or operation thresholds. If the air district has not adopted specific CEQA thresholds, the “New Source Rule” as listed on the ARB website was utilized. In one situation, the preparers of this analysis were not able to find either (nor able to contact the air district). In that case, the preparers used the most restrictive threshold, out of all of the thresholds that apply in other air districts, to compare to the projected amount of VOC emissions. The thresholds used in this analysis are set forth in Table C-1, “Construction and Operation ROG Thresholds by County Summary.”

4.2.4 Air Quality Impacts and Mitigation Measures

METHODOLOGY

As mentioned previously, the Project analyzed in this EIR is a change in the California Plumbing Code. Thus, there are no direct environmental impacts from the Project. Indirect impacts would occur due to the actions of individuals taken in response to the Project. From an ambient air quality perspective, the only identified deleterious indirect impact of the Project is the expected increase in ROG emissions due to the increased usage of CPVC plumbing adhesives. The increase in adhesive use is expected to occur as CPVC plumbing products garner a greater market share of 1) new home installations, 2) existing home re-piping, and 3) existing home slab repairs as a result of the Project.

The estimation of future increases in ROG emissions resulting from the Project requires predicting the future rate of home construction, the rate at which consumers upgrade and repair their existing plumbing, and the future market share of CPVC plumbing materials for new home and upgrade/repair renovations. The calculation of increased ROG emissions resulting from the project requires a number of assumptions and approximations. In this analysis, assumptions and approximations are made for both *design* and *worst-case* future scenarios. Design values are based on average or expected future conditions whereas worst-case assumptions are based on the maximum, or upper limit, future conditions. Design approximations used in this analysis are inherently conservative (i.e. they would tend to over predict ROG emissions). Worst-case approximations were used to estimate the maximum conceivable impact of the Project on air quality. It is expected that actual ROG emissions will be less than or equal to design estimates.

The assumptions and calculations required to estimate future ROG emissions as an indirect result of the Project are listed below.

FUTURE NEW HOUSING ESTIMATION

California residential housing construction is extremely cyclical and is affected by independent variables such as interest rates, tax law, and employment. For example, construction of multifamily units dropped dramatically after 1987 when federal tax laws changed and federal subsidies for multifamily construction were reduced. Given that it is not feasible to determine future construction activities for any single future year, a statistical approach to estimating future home construction will be used in this analysis. The methodology used to determine future California residential housing construction rates in this analysis is based on both long-term and short-term housing permitting trends as explained below.

The single family, multifamily, and total (single + multi) residential construction permits issued for each county are presented in Figures 4.2.4.1 through 4.2.4.3, respectively. In these figures the average number of housing permits issued over the last 3 years (2003-2005) and over the last 39 years (1967-2005) for each California county are displayed. The 39-year data is displayed with 95% confidence intervals to depict the natural variation in the annual amount of permitting over the last 39 years.

The standard deviation (σ) of the annual permitting data was calculated for each county based on its 39-year time series. A standard deviation for the 2003-2005 dataset was not determined since the standard deviation of three data points is not statistically meaningful for this analysis. For the entirety of this analysis, σ refers to the county-specific standard deviation of the 39-year dataset.

When characterizing a Gaussian (or normally) distributed dataset, it is expected that 68% of all data points within the dataset are within one standard deviation of the average value and that 95% of the data points are within two standard deviations of the average value. The 95% confidence limits depicted in Figures 4.2.4.1 through 4.2.4.3 are based on calculating the "average plus two standard deviations" ($+2\sigma$) and the "average minus two standard deviations" (-2σ) values for each county.

As shown in Figure 4.2.4.2, the recent 3-year average (2003-2005) multifamily permitting rate for all counties with 500 or more multifamily permits issued per year are within the 95% confidence limits. As shown in Figure 4.2.4.1, not all of the 3-year average (2003-2005) single family permitting rates are within the 39-year 95% confidence limits. For example the upper limit 95% confidence interval for Riverside county is 26,292, whereas the average number of permits issued over the last 3 years is slightly greater at 28,203.

For use in the ROG calculations in this analysis, the estimated number of new single or multifamily houses constructed in a county is termed the *new housing design value*. The design value is the greater of the 95% confidence limit based on the 39-year dataset or the 3-year average (2003-2005) plus one standard deviation (σ) of the 39-year dataset, as shown in Equation 4.2.4.1. Although it is statistically justifiable to use only the 39-year 95% confidence limit to determine future housing construction, there are some counties where recent construction is close to, or exceeding, the 1967-2005 95% confidence limit. For these counties the selection of the 3-year average + one standard deviation will ensure that the design value is significantly greater than recent housing construction. This hybridized approach to housing construction estimation will ensure the selection of a conservative design value. That is, the design value will likely be significantly greater than the actual amount of housing construction for any given year.

$$\text{design} = \text{the greater of } (\bar{x}_{39} + 2\sigma_{39}) \text{ or } (\bar{x}_3 + \sigma_{39}) \qquad \text{Equation 4.2.4.1}$$

Where:
design = the estimated annual number of houses built in a given county for ROG calculation purposes
$\bar{x}_{39}$ - the average number of permits issued in a given county from 1967-2005
$\bar{x}_3$ - the average number of permits issued in a given county from 2003-2005
σ_{39} - the standard deviation of permits issued in a given county from 1967-2005

FUTURE RE-PIPING ESTIMATION

It is estimated that the future number of existing homes to be completely re-plumbed with all available plumbing materials is approximately 100,000 per year.[16] Since the re-piping estimate applies to the entire state of California rather than being specific to any county, additional assumptions are required to estimate the number of re-pipes in each county. There are numerous methodologies that could be employed to convert statewide statistics to county-specific values. The methodology used in this study is to distribute the statewide re-piping activity in proportion to the single and multifamily housing permits issued in each county from 2003 to 2005, which is shown graphically in Figure 4.2.4.4. This methodology was selected because it concentrates re-piping activity in the high growth areas where there is likely to be a correspondingly high ROG emission rate from new home construction.

FUTURE SLAB REPAIR ESTIMATION

Slab repair refers to the repair of leaking pipes located within or beneath a housing slab. Slab repair involves the removal of a leaking pipe section(s) and the installation of a new pipe section(s). Typically, plumbers use straight pipe sections or pipes with comparatively few joints near areas coincident with housing slabs to avoid leaks in areas that are difficult to service. It has been estimated that a typical slab repair operation results in approximately one fiftieth (2%) of the number of joints required by a new home installation.

[16] Email from Bob Raymer, CBIA, to Robin Gilb, California Department of Housing and Community Development (Mar. 22, 2006). In the July 2006 Draft EIR, it was erroneously stated that there would be 100,000 houses per year re-piped with *CPVC* rather than with *all plumbing materials*.

It has been estimated that there are likely to be 200,000 slab repairs conducted in California each year.[17] For this analysis, the statewide average number of slab repairs is distributed to each county in the same manner that re-piping values are distributed. Furthermore, it is assumed that a slab repair results in the creation of 5% (design value), with an upper limit of 10% (maximum value), of the number of joints required for a new home installation. These values were selected because they are at least two to five times greater than the industry-estimated slab repair joint fractions and, thus, result in inherently conservative ROG emissions. This intentional overestimation compensates for any possible under-estimation of the annual number of slab repairs or under-estimation of the typical number of joints involved in a slab repair.

FUTURE CPVC MARKET SHARE ESTIMATION

The current market share of CPVC for plumbing in new homes is estimated to be 13% for California and 30% nationally.[18] Based on NAHB estimates, the annual average number of permits for new housing construction for the entire U.S. and California, averaged from 2003 to 2005, are 1,957,267 and 205,871, respectively. The average new home CPVC market share for U.S. states other than California can be determined based on a weighted average of recent new home building rates as shown in Equation 4.2.4.2. Based on Equation 4.2.4.2, the non-California national market share of CPVC for new home plumbing is approximately 32%.

$$MS_{49} = \frac{HC_n * MS_n - HC_c * MS_c}{HC_n - HC_c} \qquad \text{Equation 4.2.4.2}$$

Where:
MS_{49} is the CPVC market share in the 49 states excluding California
MS_c is the CPVC market share for California [13%]
MS_n is the CPVC market share for entire nation [30%]
HC_n is the annual national housing construction [1,957,267]
HC_c is the annual Californian housing construction [205,871]

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[17] Email from Bob Raymer, CBIA, to Robin Gilb, California Department of Housing and Community Development (Mar. 22, 2006).

[18] E-mail from Jeff Cash, Business Director, Americas Plumbing, Noveon, February 23, 2006, (Doc.220). These estimates are based on an average of California and national aggregate data for 2004 and 2005 obtained from the NAHB Research Center, a subsidiary of the National Association of Home Builders (NAHB). The Research Center's California aggregate data includes Hawaii, but the number of new homes built during these years in Hawaii are not significant. The Research Center's 2004 and 2005 California aggregate data show that CPVC accounted for 13% of the market share both years. The Research Center's 2004 and 2005 aggregate national data showed that CPVC accounted for 24% of the market share in 2004 and 27% in 2005. Thus, CPVC accounted for an average of 13% of the market share in California and 25.5% nationally. The national average has been rounded up to 30 percent in order to provide a more conservative estimate.

It is not possible to determine the ultimate mature market share that CPVC will achieve as a result of this Project, since the ultimate market share will result from complex, free-market economic activity. However, given California's geographical diversity, it is likely that the mature California CPVC market share will more closely resemble the *average* market share in the other 49 states rather than resembling any one individual state. It is also reasonable to assume that the *maximum* market share that CPVC plumbing will achieve will not exceed the maximum market share of any one individual state. The maximum CPVC market share for an individual state is approximately 58% in Florida, as a result of its unique topography and proximity to water bodies which necessitate the use of non-corrosive plumbing materials.[19]

Note that this EIR analyzes the environmental impacts of removing the Findings Requirement for CPVC usage, rather than the environmental impacts of all CPVC usage in California. In other words, this analysis compares the amount of CPVC usage that would occur if the Project were approved to the existing environmental baseline, under which CPVC may be approved for use in residential potable water systems by local building officials subject to the Findings Requirement. Consequently, the Project impact analysis will only consider the incremental impact of the California CPVC market share changing from its existing value to an increased market share due to the removal of the Findings Requirement. Given that the existing market share is 13%, and assuming that the removal of the Findings Requirement results in the California market share equaling that of the 49-state averaged market share of 32%, the Project will result in a 19% (32% minus 13%) increase in market share. Similarly, if the removal of the Findings Requirement results in the California market share equaling that of Florida (58%), the Project will result in a 45% (58% minus 13%) increase in market share.

For this analysis, the *design value* and *maximum value* for the estimated increase in CPVC market share as a result of the removal of the Findings Requirement are 19% and 45%, respectively. The design and maximum market share values will be applied to new home and existing home renovation activities. Note that is extremely unlikely that the California market share will become similar to that of Florida, as assumed in establishing the maximum value, given the geographical differences between the two markets. The maximum value of 45% should be seen as the upper possible limit of increased California CPVC usage, not as a realistically probable future market share.

ADHESIVE USAGE AND ROG CONTENT ESTIMATION

The estimated amount of primer and cement used to plumb multifamily and single family houses can be determined either by surveying plumbers/contractors on their average

[19] NAHB Research Center, Inc., *Building Practices Report: Product Usage -- 2004 Data*.

usage rates or by estimating the number of joints and fittings required for a CPVC installation and determining the per joint/fitting adhesive usage by calculation.

As shown in Table 4.2.4.1, multiple methods were used to estimate adhesive usage in a new home installation. Ultimately the E-Z Weld approach was selected for this analysis because it resulted in the greatest (most conservative) application rates.

The E-Z Weld methodology involved estimating the number of joints and fittings in a typical home and then using the online E-Z Weld calculation tool found at http://members.aol.com/ezweld/ezcalc.html to convert the joint/fitting information into adhesive usage. The adhesive usage rates based on the E-Z Weld analysis are shown below:

Adhesive usage when using primer and cement:

0.270 L of primer and 0.810 L of cement used for each SF unit
0.110 L of primer and 0.420 L of cement used for each MF unit

Note that primer and cleaner are synonyms and are used interchangeably. If one-step cement designed to be used without primer were used, the adhesive usage would be as follows:

Adhesive usage when using one-step cement:

0.000 L of primer and 0.810 L of one-step cement used for each SF unit
0.000 L of primer and 0.420 L of one-step cement used for each MF unit

As discussed in the Regulatory Setting, the VOC content of various CPVC adhesives are known and/or regulated. Note that only the fraction of VOCs that are ROGs in adhesives will actually participate in photochemical reactions which in turn lead to ozone formation. For instance acetone is a VOC, but it is not an ROG. Furthermore, many air districts require the use of adhesives with more restrictive VOC content than the typical 'low-VOC' adhesives on the market. The ARB has determined that the Reasonable Available Control Technology (RACT) for VOCs in adhesives, including the cements and primers used to join CPVC pipe for potable water systems in residential buildings, is 490 g/L for cement and 650 g/L for primer.[20] There are, however, currently several brands of CPVC primer on the market with a 550 g/L VOC content limit.

[20] California Air Resources Board, Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Adhesives and Sealants (1998). (Doc. 182).

By assuming that adhesive ROG content in primer is equal to the average low-VOC content available currently on the market, by assuming that ROG content in cement will not exceed the RACT established by ARB, and by disregarding the fact that more stringent CPVC adhesive regulations exist in certain air districts, the ROG estimates used in this analysis are inherently conservative.

ROG content of CPVC adhesives content design values:
Primer (AKA cleaner): 550 g/L[21]
Cement intended for use with primer: 490 g/L[22]
One-step cement intended for use without primer: 490 g/L[23]

CONSTRUCTION ACTIVITY ESTIMATION

Future housing construction rate estimates are based on annual county-specific permitting. Since several districts have separate regulations for annual and daily ROG emissions, a methodology is required to convert annual construction estimates to daily construction estimates. For this analysis it is assumed that housing construction will only occur during spring, summer, and fall (75% of the year) because winter is the typical rainy season for California. In reality, precipitation events in parts of California (such as Los Angeles) are quire rare (well below 25% of the year). However, by assuming that wintertime construction does not occur, the emissions of ROG from construction activity are concentrated on the days when ozone exceedences are likely thereby making this approach inherently conservative. In addition, it is assumed that construction activity only occurs during five days a week (71.4% of the week). Based on these assumptions, the number of construction days per year for design calculations is 196 ([3/4]*[5/7]*365).

SAFETY FACTOR DISCUSSION

Every effort has been made to make conservative assumptions regarding home construction rates, market penetration, usage rates, and ROG content of CPVC adhesives. However, it is still possible that the actual future adhesive emissions from CPVC usage exceed the design estimates discussed above. For instance, there could be a housing boom in CA in excess of the housing patterns analyzed for the last 39 years, actual adhesive application rates may be higher than estimated due to excess spillage by contractors new to CPVC usage, or it is possible that there are

[21] *See, e.g.,* IPS Weld-On, Material Safety Data Sheet (Jan. 2005).
[22] *See, e.g.,* Oatey CPVC Medium Orange Cement, Materal Safety Data Sheet at p. 6 (May 20, 2005).
[23] *See, e.g.,* Oatey Lo-V.O.C. CPVC FlowGuard Gold® 1-Step Yellow Cement, Materal Safety Data Sheet at p. 6 (May 20, 2005).

unforeseeable indirect consequences associated with removing the CPVC Findings Requirement.

To address these concerns, ROG emissions from CPVC usage were calculated with a safety factor (S.F.) of 2 for both design and worst-case analyses. A safety factor of 2 indicates that ROG emissions are 100% greater than what would be expected based on the assumptions listed above. In reality, since the assumptions used to estimate ROG emissions were conservative in the first place it is very unlikely that actual emissions would be 100% greater than initially estimated, however, out of an abundance of caution, the calculations were also completed with a S.F. of 2 for comparative purposes.

RESULTS

Assumptions and constants used to determine the increased ROG emissions associated with the project are listed in Table 4.2.4.2. The definitions and footnotes common to project analysis tables are listed in Table 4.2.4.3. Calculations based on the assumptions and methodology listed above are presented in Tables 4.2.4.4 through 4.2.4.11. Sample calculations for the determination of ROG emissions from Los Angeles County are presented as Table 4.2.4.16 as guide to interpreting and reproducing Tables 4.2.4.4 through 4.2.4.11. Note that slight differences between the calculations in various tables are expected due to rounding errors.

Comparisons of each county's estimated ROG emissions with the appropriate air district's most restrictive operational or construction threshold are presented in Table 4.2.4.12 and 4.2.4.13 for the annual and daily emission values, respectively. Comparisons of each air district's estimated ROG emissions summed across all counties in the district compared to the district's most restrictive operational or construction threshold are presented in Table 4.2.4.14 and 4.2.4.15 for the annual and daily emission values, respectively. Note that certain districts contain only portions of certain counties. For purposes of this analysis, it is assumed that each air district contains the entirety of each county that is located partially or wholly within the district, as a conservative measure.

SIGNIFICANCE DISCUSSION

<u>Impact 4.2–1</u>: The Project Could Increase ROG Emissions in Several Air Districts to a Level that Exceeds the ROG Significance Thresholds Established by Those Districts

Each California air district has established ROG significance thresholds. Those thresholds are based on either tons per year or pounds per day limits (see Table C-1). Those thresholds, along with the Project's contribution to ROG emissions in each air district, are compared in Tables 4.2.4.14 and 4.2.4.15. Those tables show that the Project would generate ROG emissions exceeding the most restrictive significance thresholds in the following air districts:

- Bay Area Air Quality Management District;
- Feather River Air Quality Management District;
- Mojave Desert Air District;
- Sacramento Metropolitan Air Quality Management District;
- San Luis Obispo County Air Pollution Control District,
- San Joaquin Valley Air Pollution Control District; and
- South Coast Air Quality Management District.
-

Consequently, the Project would result in a significant increase in ROG emissions in each of the air districts listed above. The Lead Agency considers this to be a significant air quality impact.

***Mitigation Measure 4.2-1*: Require the Use of One-Step Cement (Without Primer)**

The use of one-step cement would lower ROG emissions by 25% for single-family residential uses and by 21% for multi family residential. This mitigation measure would reduce ROG emissions to a less than significant level for the Feather River Air Quality Management District. However, despite the reduction, ROG emissions would still exceed the significance thresholds in the following air districts:

- Bay Area Air Quality Management District;
- Mojave Desert Air District;
- Sacramento Metropolitan Air Quality Management District;
- San Luis Obispo County Air Pollution Control District;
- San Joaquin Valley Air Pollution Control District; and
- South Coast Air Quality Management District.

Thus, even with implementation of this mitigation measure, ROG emissions would result in a significant and unavoidable air quality impact.

References

Air Resources Board, 2006. The California Almanac of Emissions and Air Quality, Sacramento, CA.

California Air Resources Board, accessed November 2, 2006
http://www.arb.ca.gov/regact/area05/atta.pdf

Federal Environmental Protection Agency website, March 2, 2006; accessed November 2, 2006
http://www.epa.gov/oar/oaqps/greenbk/gncs.html#CALIFORNIA

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Table 4.2.1. Ambient Air Quality Standards						
Pollutant	**Average Time**	**California Standards**		**National Standards**		
		Concentration	**Measurement Method**	**Primary**	**Secondary**	**Measurement Method**
Ozone (O_3)	1 hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	--	--	Ultraviolet Photometry
	8 hour	0.07 ppm (137 µg/m^3)		0.08 ppm (157 µg/m^3)	0.08 ppm (157 µg/m^3)	
Respirable Particulate Matter (PM_{10})	24 hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	150 µg/m^3	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		50 µg/m^3	50 µg/m^3	
Fine Particulate Matter ($PM_{2.5}$)	24 hour	No Separate State Standard		65 µg/m^3	65 µg/m^3	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	8 hour	9.0 ppm (10 mg/m^3)	Non-Dispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Spectroscopy (NDIR)
	1 hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	--	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	Gas Phase Chemiluminescence
	1 hour	0.25 ppm (470 µg/m^3)		--	--	

Table 4.2.1. Ambient Air Quality Standards

POLLUTANT	AVERAGE TIME	CALIFORNIA STANDARDS		NATIONAL STANDARDS		
		CONCENTRATION	MEASUREMENT METHOD	PRIMARY	SECONDARY	MEASUREMENT METHOD
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	--	Ultraviolet Fluorescence	0.03 ppm (80 $\mu g/m^3$)	--	Pararosaniline
	24 hour	0.04 ppm (105 $\mu g/m^3$)		0.14 ppm (365 $\mu g/m^3$)	--	
	3 hour	--		--	0.5 ppm (1300 $\mu g/m^3$)	
	1 hour	0.25 ppm (655 $\mu g/m^3$)		--	--	
Lead (Pb)	30-day Average	1.5 $\mu g/m^3$	Atomic Absorption	--	--	High Volume Sampler and Atomic Absorption
	Calendar Quarter	--		1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	
Visibility Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer – visibility of ten miles or more due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 hour	25 $\mu g/m^3$	Ion Chromatography			
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet Fluorescence			
Vinyl Chloride	24 hour	0.010 ppm (26 $\mu g/m^3$)	Gas Chromatography			

Source: ARB 2006. http://www.arb.ca.gov/aqs/aqs.htm (Ambient Air Quality Standards)
ppm= parts per million
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3= milligrams per cubic meter

Notes:
1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter – Pm10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.

California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25oC and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

8. New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18, 1997. Contact U.S. EPA for further clarification and current federal policies.

9. The ARB has identified lead and vinyl chloride as ‘toxic air contaminants’ with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Table B - 3. Air Districts By County

County	Air District
Alameda	Bay Area AQMD
Alpine	Great Basin Unified APCD
Amador	Amador County APCD
Butte	Butte County AQMD
Calaveras	Calaveras County APCD
Colusa	Colusa County APCD
Contra Costa	Bay Area AQMD
Del Norte	North Coast Unified AQMD
El Dorado	El Dorado County AQMD
Fresno	San Joaquin Valley Unified APCD
Glenn	Glenn County APCD
Humboldt	North Coast Unified AQMD
Imperial	Imperial County APCD
Inyo	Great Basin Unified APCD
Kern	Kern County APCD
	San Joaquin Valley Unified APCD
Kings	San Joaquin Valley Unified APCD
Lake	Lake County AQMD
Lassen	Lassen County APCD
Los Angeles	Antelope Valley AQMD
	South Coast AQMD
Madera	San Joaquin Valley Unified APCD
Marin	Bay Area AQMD
Mariposa	Mariposa County APCD
Mendocino	Mendocino County AQMD
Merced	San Joaquin Valley Unified APCD
Modoc	Modoc County APCD

Table B - 3. Air Districts By County	
County	**Air District**
Mono	Great Basin Unified APCD
Monterey	Monterey Bay Unified APCD
Napa	Bay Area AQMD
Nevada	Northern Sierra AQMD
Orange	South Coast AQMD
Placer	Placer County APCD
Plumas	Northern Sierra AQMD
Riverside	Mojave Desert AQMD
	South Coast AQMD
Sacramento	Sacramento Metropolitan AQMD
San Benito	Monterey Bay Unified APCD
San Bernardino	Mojave Desert AQMD
	South Coast AQMD
San Diego	San Diego County APCD
San Francisco	Bay Area AQMD
San Joaquin	San Joaquin Valley Unified APCD
San Luis Obispo	San Luis Obispo County APCD
San Mateo	Bay Area Air AQMD
Santa Barbara	Santa Barbara County APCD
Santa Clara	Bay Area AQMD
Santa Cruz County	Monterey Bay Unified APCD
Shasta County	Shasta County AQMD
Sierra County	Northern Sierra AQMD
Siskiyou County	Siskiyou County APCD
Solano County	Bay Area AQMD
	Yolo-Solano AQMD
Sonoma County	Bay Area AQMD
	Northern Sonoma County APCD

Table B - 3. Air Districts By County	
County	**Air District**
Stanislaus County	San Joaquin Valley Unified APCD
Sutter County	Feather River AQMD
Tehama County	Tehama County APCD
Trinity County	North Coast Unified AQMD
Tulare County	San Joaquin Valley Unified APCD
Tuolumne County	Tuolumne County APCD
Ventura County	Ventura County APCD
Yolo County	Yolo-Solano AQMD
Yuba County	Feather River AQMD

TABLE C -1. CONSTRUCTION AND OPERATION ROG THRESHOLDS BY COUNTY SUMMARY							
COUNTIES	**AIR DISTRICT**	**CONSTRUCTION ROG**		**OPERATION ROG**		**MOST STRICT ROG**	
		TONS/YEAR	**LBS/DAY**	**TONS/YEAR**	**LBS/DAY**	**TONS/YEAR**	**LBS/DAY**
Alameda	Bay Area AQMD	40	-	15	80	**15**	**80**
Alpine	Great Basin	-	150	-	150	**-**	**150**
Amador	Amador County APCD	25	-	25	-	**25**	**-**
Butte Level A	Butte County AQMD	-	25/137	-	25/137	**-**	**25**
Calaveras	Calaveras	10	-	10	-	**10**	**-**
Colusa	Colusa	10	-	10	-	**10**	**-**
Contra Costa	Bay Area AQMD	40	-	15	80	**15**	**80**
Del Norte	North Coast Unified AQMD	10	-	10	-	**10**	**-**
El Dorado	El Dorado County APCD	-	82	-	82	**-**	**82**
Fresno	San Joaquin Valley APCD	10	-	10	-	**10**	**-**
Glenn	Glenn	-	25	-	25	**-**	**25**
Humboldt	North Coast Unified AQMD	10	-	10	-	**10**	**-**
Imperial	Imperial County APCD	10	-	-	55	**10**	**55**
Inyo	Great Basin	-	150	-	150	**-**	**150**
Kern	Kern County APCD	25	-	-	137	**25**	**137**

TABLE C -1. CONSTRUCTION AND OPERATION ROG THRESHOLDS BY COUNTY SUMMARY							
COUNTIES	AIR DISTRICT	CONSTRUCTION ROG		OPERATION ROG		MOST STRICT ROG	
		TONS/YEAR	LBS/DAY	TONS/YEAR	LBS/DAY	TONS/YEAR	LBS/DAY
Kings County	San Joaquin Valley APCD	10	-	10	-	**10**	**-**
Lake	Lake County AQMD	-	150	-	150	**-**	**150**
Lassen County	Lassen	-	150	-	150	**-**	**150**
Los Angeles	South Coast AQMD Antelope Valley AQMD	25	75/137	25	55/137	**25**	**55**
Madera	San Joaquin Valley APCD	10	-	10	-	**10**	**-**
Marin	Bay Area AQMD	40	-	15	80	**15**	**80**
Mariposa	Mariposa County APCD	100	-	100	-	**100**	**-**
Mendocino	Mendocino County AQMD	40	-	40	-	**40**	**-**
Merced	San Joaquin Valley APCD	10	-	10	-	**10**	**-**
Modoc	Modoc County APCD	250	250	-	250	**250**	**250**
Mono	Great Basin	-	150	-	150	**-**	**150**
Monterey	Monterey Bay Unified APCD	-	82	-	137	**-**	**82**
Napa	Bay Area AQMD	40	-	15	80	**15**	**80**

TABLE C -1. CONSTRUCTION AND OPERATION ROG THRESHOLDS BY COUNTY SUMMARY							
COUNTIES	AIR DISTRICT	CONSTRUCTION ROG		OPERATION ROG		MOST STRICT ROG	
		TONS/YEAR	LBS/DAY	TONS/YEAR	LBS/DAY	TONS/YEAR	LBS/DAY
Nevada	Northern Sierra AQMD	-	137	50	-	**50**	**137**
Orange	South Coast AQMD	-	75	-	55	**-**	**55**
Placer	Placer County APCD	-	82	-	82	**-**	**82**
Plumas	Northern Sierra AQMD	-	137	50	-	**50**	**137**
Riverside	Mojave Desert South Coast AQMD	10	75	10	10/55	**10**	**10**
Sacramento	Sacramento Metropolitan AQMD	10	-	-	65	**10**	**65**
San Benito	Monterey Bay Unified APCD	-	82	-	137	**-**	**82**
San Bernadino	Mojave Desert South Coast AQMD	10	75	10	10/55	**10**	**55**
San Diego	San Diego APCD	-	250	-	250	**-**	**250**
San Francisco	Bay Area AQMD	40	-	15	80	**15**	**80**
San Joaquin	San Joaquin Valley APCD	10	-	10	-	**10**	**-**
San Luis Obispo Tier 3	San Luis Obispo County APCD	10	185	25	10/25	**10**	**10**
San Mateo	Bay Area AQMD	40	-	15	80	**15**	**80**

TABLE C -1. CONSTRUCTION AND OPERATION ROG THRESHOLDS BY COUNTY SUMMARY							
COUNTIES	**AIR DISTRICT**	**CONSTRUCTION ROG**		**OPERATION ROG**		**MOST STRICT ROG**	
		TONS/YEAR	**LBS/DAY**	**TONS/YEAR**	**LBS/DAY**	**TONS/YEAR**	**LBS/DAY**
Santa Barbara	Santa Barbara County APCD	-	25	-	25	**-**	**25**
Santa Clara	Bay Area AQMD	40	-	15	80	**15**	**80**
Santa Cruz	Monterey Bay Unified APCD	-	82	-	137	**-**	**82**
Shasta	Shasta County AQMD	-	25/137	-	25/137	**-**	**25**
Siskiyou	Siskiyou County APCD	40	-	40	-	**40**	**-**
Solano	Bay Area AQMD	40	-	15	80	**15**	**80**
Solano	Yolo Solano AQMD	25	-	25	-	**25**	**-**
Sonoma	Bay Area AQMD Northern Sonoma APCD	40	-	15/40	80	**15**	**80**
Stanislaus	San Joaquin Valley APCD	10	-	10	-	**10**	**-**
Sutter	Feather River AQMD	-	25	-	25	**-**	**25**
Tehama	Tehama County APCD	10	-	25	-	**10**	**-**
Trinity	North Coast Unified AQMD	10	-	10	-	**10**	**-**

TABLE C -1. CONSTRUCTION AND OPERATION ROG THRESHOLDS BY COUNTY SUMMARY							
COUNTIES	AIR DISTRICT	CONSTRUCTION ROG		OPERATION ROG		MOST STRICT ROG	
		TONS/YEAR	LBS/DAY	TONS/YEAR	LBS/DAY	TONS/YEAR	LBS/DAY
Tulare	San Joaquin Valley APCD	10	-	10	-	**10**	**-**
Tuolumne	Tuolumne County APCD	100	1000	100	1000	**100**	**1000**
Ventura	Ventura County APCD	5	-	5	-	**5**	**-**
Yolo	Yolo Solano AQMD	25	-	25	-	**25**	**-**
Yuba County	Feather River AQMD	-	25	-	25	**-**	**25**

Table 4.2.4.1 Estimation of Adhesive Use for Typical Single and Multi Family Houses

Single Family Unit, approximately 2200 sq. ft.			
Cement (liters)			
Source		**Source Estimated**	**E-Z Weld Calc tool**
Doc.191		0.35	0.90
Doc.206**		0.76	0.75
Doc.207*		0.47	0.70
Doc.192		0.35	0.90
Doc.189		0.24	0.79
	average	0.43	0.81
	std dev	0.18	0.08
Primer (liters)			
Source		**Source Estimated**	**E-Z Weld Calc tool**
Doc.191		0.12	0.30
Doc.206**		0.25	0.25
Doc.207*		0.16	0.23
Doc.192		0.12	0.30
Doc.189		0.24	0.26
	average	0.18	0.27
	std dev	0.06	0.03
Multifamily Unit			
Cement (liters)			
Source		**Source Estimated**	**E-Z Weld Calc tool**
Doc.190*		0.12	0.51
Doc.197**		0.33	0.33
	average	0.23	0.42
	std dev	0.11	0.09
Primer (liters)			
Doc.190*		0.04	0.12
Doc.197**		0.11	0.11
	average	0.09	0.11
	std dev	0.03	0.01

Doc.190 used 975 sq. ft. as the unit size
Doc.197 used 1,200 sq. ft. as the unit size

*Source estimated adhesive using one-step cement (no primer).
For estimation purposes, we assume primer use would have been 1/3 the amount of cement.
** Source used E-Z Weld Calc tool to estimate adhesive use
Note: source data was converted to quarts and multiplied by 0.946 to obtain the volume in liters

Table 4.2.4.2: Assumptions and Constants Used to Determine the Increased ROG Emissions Associated with the Project

Assumptions and Constants	
New House Design Market Share	19%
New House Upper Limit Market Share	45%
Re-pipe Design Market Share	19%
Re-pipe Upper Limit Market Share	45%
Slab Repair Design Market Share	19%
Slab Repair Upper Limit Market Share	45%
Design Slab Repair (% of total fittings)/New House	5%
Upper Limit Slab Repair (% of total fittings)/New House	10%
Cement ROG Content (g/L)	490
Primer ROG Content (g/L)	550
MF Cement Use/House (L)	0.42
SF Cement Use/House (L)	0.81
MF Primer Use/House (L)	0.11
SF Primer Use/House (L)	0.27
Safety Factor	2.00
Number of Construction days / year	196
Average Number of Re-pipes / year	100,000
Number of Slab Repairs/year	200,000

Table 4.2.4.3: Definitions and Footnotes Common to Project Analysis Tables

Definitions:

SF	Single Family Unit
MF	Multiple Family Unit
S.F.	Safety Factor
σ	Standard Deviation
Design	Conservatively Estimated Expected Future Value
Upper Limit	Maximum Conceivable (Within Reason) Future Value
Max	Same as Upper Limit

Footnotes:

[1] New Housing Estimates are based on the greater of the 1967-2005 approach (mean + 2 standard deviations) or the 2003 -2005 approach (mean + 1 standard deviations)

[2] New houses design value times the design and maximum (Upper) Market share for CPVC

[3] Avg. number of re-pipes per year, times the recent (2003-2005) County % of New Houses, times the lower (Average) and Upper (Max) Market share for re-pipes

[4] Est. number of slab repairs per year, times the recent (2003-2005) County % of New Houses, times the design and upper limit (Max) Market share for slab repairs times, times the percent of total fittings in a house that are typically replaced in a "Slab Repair"

[5] New CPVC Houses + Re-Pipe Houses + Slab Repair Houses

[6] Equivalent House Installations times Primer and Cement use per house, times respective ROG content

[7] Total = Primer plus Cement ROG Emissions

Table 4.2.4.4: Single and Multi Family Permits Issued in County From 1967 to 2005											
	1967-2005 New Houses By County						2003-2005 New Houses By County				
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF unit	SF unit
County	Avg	Avg	Avg	σ	σ	σ	Avg	Avg	Avg	% CA	% CA
ALAMEDA	2,557	3,136	5,694	1,699	1,145	2,643	2,918	1,958	4,876	1.42%	0.95%
ALPINE	11	13	24	21	9	24	0	22	22	0.00%	0.01%
AMADOR	28	268	296	37	95	110	65	362	428	0.03%	0.18%
BUTTE	384	859	1,243	323	348	523	344	1,495	1,839	0.17%	0.73%
CALAVERAS	20	462	482	22	198	204	9	785	794	0.00%	0.38%
COLUSA	10	65	75	23	38	44	30	150	180	0.01%	0.07%
CONTRA COSTA	1,763	4,267	6,031	1,614	1,395	2,386	1,350	4,880	6,230	0.66%	2.37%
DEL NORTE	28	74	101	56	40	80	35	113	148	0.02%	0.06%
EL DORADO	188	1,370	1,559	161	614	655	111	1,844	1,955	0.05%	0.90%
FRESNO	1,750	3,070	4,820	1,297	1,107	1,661	1,575	5,367	6,941	0.76%	2.61%
GLENN	24	80	104	42	38	63	27	142	169	0.01%	0.07%
HUMBOLDT	134	377	512	88	102	169	68	445	513	0.03%	0.22%
IMPERIAL	203	487	690	167	447	528	438	1,676	2,114	0.21%	0.81%
INYO	10	45	55	16	27	37	0	16	16	0.00%	0.01%
KERN	1,004	2,964	3,968	774	1,464	1,621	853	6,820	7,672	0.41%	3.31%
KINGS	140	467	607	131	194	225	128	871	999	0.06%	0.42%
LAKE	41	302	344	40	164	181	80	480	560	0.04%	0.23%
LASSEN	17	101	119	32	47	64	4	178	182	0.00%	0.09%
LOS ANGELES	18,476	10,483	28,959	12,853	4,429	16,092	13,338	11,293	24,632	6.48%	5.49%
MADERA	136	682	819	104	425	481	181	1,576	1,757	0.09%	0.77%
MARIN	438	655	1,092	490	347	780	217	521	738	0.11%	0.25%
MARIPOSA	7	112	119	14	44	45	1	157	159	0.00%	0.08%
MENDOCINO	89	353	443	94	110	185	18	326	344	0.01%	0.16%
MERCED	266	995	1,261	236	650	672	246	2,842	3,087	0.12%	1.38%
MODOC	4	32	36	14	28	33	0	24	24	0.00%	0.01%
MONO	172	95	267	214	44	239	228	131	359	0.11%	0.06%
MONTEREY	614	1,112	1,726	544	290	711	222	1,110	1,332	0.11%	0.54%
NAPA	190	516	707	164	184	270	146	596	742	0.07%	0.29%
NEVADA	87	877	963	70	470	507	179	727	907	0.09%	0.35%
ORANGE	7,813	8,554	16,366	5,027	3,938	8,387	3,940	4,673	8,613	1.91%	2.27%
PLACER	529	2,436	2,965	461	1,334	1,655	390	4,757	5,147	0.19%	2.31%
PLUMAS	15	194	209	25	86	95	4	263	267	0.00%	0.13%
RIVERSIDE	2,835	10,713	13,548	2,242	7,789	9,044	4,704	28,203	32,907	2.28%	13.70%
SACRAMENTO	3,071	5,832	8,903	2,437	2,489	3,731	2,676	9,506	12,181	1.30%	4.62%
SAN BENITO	40	267	307	44	171	173	13	99	112	0.01%	0.05%
SAN BERNARDINO	2,681	8,191	10,872	3,215	4,457	6,987	2,559	13,372	15,931	1.24%	6.50%
SAN DIEGO	9,854	9,768	19,622	6,944	3,977	10,489	7,988	8,971	16,959	3.88%	4.36%
SAN FRANCISCO	1,608	163	1,772	889	83	889	2,161	64	2,225	1.05%	0.03%
SAN JOAQUIN	915	2,756	3,671	766	1,526	1,450	344	6,359	6,703	0.17%	3.09%
SAN LUIS OBISPO	419	1,454	1,873	382	544	802	321	1,822	2,143	0.16%	0.89%
SAN MATEO	1,242	1,140	2,382	1,257	630	1,785	504	598	1,102	0.24%	0.29%
SANTA BARBARA	692	975	1,667	586	347	767	402	963	1,365	0.20%	0.47%

Table 4.2.4.4: Single and Multi Family Permits Issued in County From 1967 to 2005											
	1967-2005 New Houses By County						2003-2005 New Houses By County				
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF unit	SF unit
County	Avg	Avg	Avg	σ	σ	σ	Avg	Avg	Avg	% CA	% CA
SANTA CLARA	4,023	4,402	8,425	2,534	2,528	4,455	3,760	2,529	6,289	1.83%	1.23%
SANTA CRUZ	417	786	1,203	364	446	744	279	687	967	0.14%	0.33%
SHASTA	251	895	1,146	232	380	535	223	1,096	1,319	0.11%	0.53%
SIERRA	1	23	24	8	14	19	0	17	17	0.00%	0.01%
SISKIYOU	44	205	248	44	102	130	98	239	337	0.05%	0.12%
SOLANO	641	2,015	2,656	574	1,105	1,361	513	2,238	2,751	0.25%	1.09%
SONOMA	847	2,231	3,078	621	769	1,206	971	1,457	2,428	0.47%	0.71%
STANISLAUS	650	2,285	2,935	552	1,156	1,374	338	4,160	4,498	0.16%	2.02%
SUTTER	133	387	520	121	276	284	76	1,130	1,206	0.04%	0.55%
TEHAMA	68	227	295	82	127	159	16	558	574	0.01%	0.27%
TRINITY	4	73	77	10	37	41	3	64	67	0.00%	0.03%
TULARE	399	1,511	1,910	273	466	596	386	2,456	2,842	0.19%	1.19%
TUOLUMNE	47	426	473	53	209	240	12	368	380	0.01%	0.18%
VENTURA	1,405	2,925	4,330	1,060	1,380	2,084	1,366	2,219	3,585	0.66%	1.08%
YOLO	448	726	1,173	314	307	448	508	1,391	1,899	0.25%	0.68%
YUBA	79	270	349	91	358	355	0	1,337	1,337	0.00%	0.65%
Statewide Total	**69,962**	**106,153**	**176,114**				**57,371**	**148,500**	**205,871**	**28%**	**72%**

Table 4.2.4.5: Determination of Design Values Used to Predict Future Home Construction by County

	New Houses: 1967-2005			New Houses: 2003-2005			New Houses	
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF
County	Avg+2σ	Avg+2σ	Avg+2σ	Avg+σ	Avg+σ	Avg+σ	Design1	Design1
ALAMEDA	5,956	5,426	10,980	4,617	3,103	7,519	5,956	5,426
ALPINE	53	32	72	21	31	46	53	32
AMADOR	102	459	515	102	458	537	102	459
BUTTE	1,030	1,555	2,289	668	1,843	2,362	1,030	1,843
CALAVERAS	64	857	890	31	983	998	64	983
COLUSA	56	141	164	53	187	224	56	187
CONTRA COSTA	4,991	7,058	10,802	2,964	6,275	8,616	4,991	7,058
DEL NORTE	140	154	262	91	153	228	140	154
EL DORADO	510	2,599	2,868	272	2,458	2,610	510	2,599
FRESNO	4,344	5,285	8,142	2,872	6,474	8,602	4,344	6,474
GLENN	108	155	230	69	179	232	108	179
HUMBOLDT	311	582	850	156	547	682	311	582
IMPERIAL	538	1,381	1,746	605	2,123	2,642	605	2,123
INYO	42	99	129	16	43	52	42	99
KERN	2,552	5,893	7,210	1,627	8,284	9,293	2,552	8,284
KINGS	401	856	1,057	258	1,065	1,224	401	1,065
LAKE	122	630	707	121	644	742	122	644
LASSEN	82	196	247	37	225	246	82	225
LOS ANGELES	44,181	19,340	61,143	26,191	15,722	40,723	44,181	19,340
MADERA	345	1,533	1,780	285	2,001	2,238	345	2,001
MARIN	1,418	1,350	2,652	708	868	1,518	1,418	1,350
MARIPOSA	35	200	210	15	201	204	35	201
MENDOCINO	277	574	812	112	436	529	277	574
MERCED	738	2,296	2,604	482	3,492	3,759	738	3,492
MODOC	32	88	101	14	52	57	32	88
MONO	600	183	744	442	175	598	600	183
MONTEREY	1,702	1,691	3,149	766	1,399	2,043	1,702	1,691
NAPA	518	884	1,247	310	779	1,012	518	884
NEVADA	226	1,817	1,978	249	1,197	1,414	249	1,817
ORANGE	17,867	16,430	33,140	8,967	8,611	17,000	17,867	16,430
PLACER	1,451	5,103	6,276	852	6,091	6,803	1,451	6,091
PLUMAS	66	365	399	29	349	362	66	365
RIVERSIDE	7,319	26,292	31,636	6,946	35,992	41,951	7,319	35,992
SACRAMENTO	7,946	10,811	16,365	5,113	11,995	15,912	7,946	11,995
SAN BENITO	127	610	653	57	270	285	127	610
SAN BERNARDINO	9,112	17,105	24,846	5,775	17,829	22,918	9,112	17,829
SAN DIEGO	23,743	17,722	40,599	14,932	12,949	27,448	23,743	17,722
SAN FRANCISCO	3,387	330	3,551	3,050	147	3,114	3,387	330
SAN JOAQUIN	2,446	5,808	6,571	1,110	7,885	8,154	2,446	7,885
SAN LUIS	1,184	2,542	3,476	703	2,366	2,945	1,184	2,542

Table 4.2.4.5: Determination of Design Values Used to Predict Future Home Construction by County

County	New Houses: 1967-2005			New Houses: 2003-2005			New Houses	
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF
	Avg+2σ	Avg+2σ	Avg+2σ	Avg+σ	Avg+σ	Avg+σ	Design1	Design1
OBISPO								
SAN MATEO	3,756	2,401	5,951	1,761	1,229	2,887	3,756	2,401
SANTA BARBARA	1,865	1,670	3,201	988	1,310	2,132	1,865	1,670
SANTA CLARA	9,090	9,459	17,335	6,294	5,057	10,744	9,090	9,459
SANTA CRUZ	1,144	1,679	2,691	643	1,134	1,710	1,144	1,679
SHASTA	714	1,656	2,216	455	1,477	1,854	714	1,656
SIERRA	18	51	61	8	31	36	18	51
SISKIYOU	132	408	508	142	341	467	142	408
SOLANO	1,790	4,224	5,378	1,088	3,342	4,112	1,790	4,224
SONOMA	2,089	3,770	5,490	1,592	2,226	3,634	2,089	3,770
STANISLAUS	1,754	4,597	5,683	890	5,316	5,872	1,754	5,316
SUTTER	375	940	1,089	198	1,406	1,491	375	1,406
TEHAMA	233	480	613	99	685	733	233	685
TRINITY	23	148	159	13	101	108	23	148
TULARE	945	2,443	3,101	659	2,922	3,438	945	2,922
TUOLUMNE	153	843	952	65	576	619	153	843
VENTURA	3,525	5,685	8,498	2,426	3,599	5,669	3,525	5,685
YOLO	1,076	1,339	2,069	822	1,698	2,347	1,076	1,698
YUBA	261	985	1,059	91	1,695	1,692	261	1,695
Statewide Total	**175,064**	**209,210**	**359,145**	**109,922**	**200,029**	**297,387**	**175,165**	**233,545**

Table 4.2.4.6: Total Equivalent CPVC Housing Installations per Year																
	New CPVC Housing[2]				Equivalent Re-pipes (Number of Houses)[3]				Equivalent Slab Repairs [4]				Equivalent Housing Installations[5]			
	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF
County	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max
ALAMEDA	1,132	1,031	2,680	2,442	269	181	638	428	27	18	128	86	1,428	1,230	3,445	2,956
ALPINE	10	6	24	15	0	2	0	5	0	0	0	1	10	8	24	20
AMADOR	19	87	46	206	6	33	14	79	1	3	3	16	26	124	63	302
BUTTE	196	350	464	829	32	138	75	327	3	14	15	65	231	502	554	1,221
CALAVERAS	12	187	29	442	1	72	2	172	0	7	0	34	13	266	31	648
COLUSA	11	36	25	84	3	14	7	33	0	1	1	7	14	51	33	124
CONTRA COSTA	948	1,341	2,246	3,176	125	450	295	1,067	12	45	59	213	1,085	1,836	2,600	4,456
DEL NORTE	27	29	63	69	3	10	8	25	0	1	2	5	30	41	72	99
EL DORADO	97	494	230	1,170	10	170	24	403	1	17	5	81	108	681	259	1,653
FRESNO	825	1,230	1,955	2,913	145	495	344	1,173	15	50	69	235	985	1,775	2,368	4,321
GLENN	20	34	48	81	2	13	6	31	0	1	1	6	23	48	55	118
HUMBOLDT	59	111	140	262	6	41	15	97	1	4	3	19	66	156	157	379
IMPERIAL	115	403	272	955	40	155	96	366	4	15	19	73	159	574	387	1,395
INYO	8	19	19	45	0	1	0	3	0	0	0	1	8	20	19	49
KERN	485	1,574	1,149	3,728	79	629	186	1,491	8	63	37	298	572	2,266	1,372	5,517
KINGS	76	202	181	479	12	80	28	190	1	8	6	38	89	291	214	708
LAKE	23	122	55	290	7	44	18	105	1	4	4	21	31	171	76	416
LASSEN	16	43	37	101	0	16	1	39	0	2	0	8	16	61	38	148
LOS ANGELES	8,394	3,675	19,882	8,703	1,231	1,042	2,916	2,469	123	104	583	494	9,749	4,821	23,380	11,665
MADERA	65	380	155	901	17	145	40	344	2	15	8	69	84	540	203	1,314
MARIN	270	256	638	607	20	48	48	114	2	5	10	23	292	309	695	744
MARIPOSA	7	38	16	91	0	15	0	34	0	1	0	7	7	54	16	132
MENDOCINO	53	109	125	258	2	30	4	71	0	3	1	14	54	142	129	344
MERCED	140	664	332	1,571	23	262	54	621	2	26	11	124	165	952	397	2,317
MODOC	6	17	14	40	0	2	0	5	0	0	0	1	6	19	14	46
MONO	114	35	270	82	21	12	50	29	2	1	10	6	137	48	330	117
MONTEREY	323	321	766	761	21	102	49	243	2	10	10	49	346	434	824	1,052
NAPA	98	168	233	398	14	55	32	130	1	5	6	26	113	228	272	554
NEVADA	47	345	112	817	17	67	39	159	2	7	8	32	65	419	159	1,008
ORANGE	3,395	3,122	8,040	7,394	364	431	861	1,021	36	43	172	204	3,795	3,596	9,074	8,619
PLACER	276	1,157	653	2,741	36	439	85	1,040	4	44	17	208	315	1,640	755	3,989

Table 4.2.4.6: Total Equivalent CPVC Housing Installations per Year

County	New CPVC Housing[2]				Equivalent Re-pipes (Number of Houses)[3]				Equivalent Slab Repairs [4]				Equivalent Housing Installations[5]			
	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF
	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max
PLUMAS	13	69	30	164	0	24	1	57	0	2	0	11	13	96	31	233
RIVERSIDE	1,391	6,839	3,293	16,197	434	2,603	1,028	6,165	43	260	206	1,233	1,868	9,702	4,527	23,594
SACRAMENTO	1,510	2,279	3,576	5,398	247	877	585	2,078	25	88	117	416	1,781	3,244	4,277	7,891
SAN BENITO	24	116	57	274	1	9	3	22	0	1	1	4	25	126	61	300
SAN BERNARDINO	1,731	3,388	4,100	8,023	236	1,234	559	2,923	24	123	112	585	1,991	4,745	4,772	11,531
SAN DIEGO	4,511	3,367	10,684	7,975	737	828	1,746	1,961	74	83	349	392	5,322	4,278	12,780	10,328
SAN FRANCISCO	643	63	1,524	148	199	6	472	14	20	1	94	3	863	69	2,091	165
SAN JOAQUIN	465	1,498	1,101	3,548	32	587	75	1,390	3	59	15	278	500	2,144	1,191	5,216
SAN LUIS OBISPO	225	483	533	1,144	30	168	70	398	3	17	14	80	258	668	617	1,622
SAN MATEO	714	456	1,690	1,080	47	55	110	131	5	6	22	26	765	517	1,822	1,237
SANTA BARBARA	354	317	839	752	37	89	88	210	4	9	18	42	395	415	945	1,004
SANTA CLARA	1,727	1,797	4,091	4,257	347	233	822	553	35	23	164	111	2,109	2,054	5,077	4,920
SANTA CRUZ	217	319	515	756	26	63	61	150	3	6	12	30	246	389	588	936
SHASTA	136	315	321	745	21	101	49	240	2	10	10	48	158	426	380	1,033
SIERRA	3	10	8	23	0	2	0	4	0	0	0	1	3	11	8	27
SISKIYOU	27	78	64	184	9	22	21	52	1	2	4	10	37	102	90	246
SOLANO	340	803	805	1,901	47	207	112	489	5	21	22	98	392	1,030	940	2,488
SONOMA	397	716	940	1,696	90	134	212	318	9	13	42	64	495	864	1,195	2,078
STANISLAUS	333	1,010	789	2,392	31	384	74	909	3	38	15	182	368	1,432	878	3,483
SUTTER	71	267	169	633	7	104	17	247	1	10	3	49	79	382	189	929
TEHAMA	44	130	105	308	2	51	4	122	0	5	1	24	46	187	109	455
TRINITY	4	28	10	67	0	6	1	14	0	1	0	3	5	35	11	83
TULARE	179	555	425	1,315	36	227	84	537	4	23	17	107	219	805	526	1,959
TUOLUMNE	29	160	69	380	1	34	3	80	0	3	1	16	30	198	72	476
VENTURA	670	1,080	1,586	2,558	126	205	299	485	13	20	60	97	808	1,305	1,944	3,140
YOLO	204	323	484	764	47	128	111	304	5	13	22	61	256	464	617	1,129
YUBA	50	322	117	763	0	123	0	292	0	12	0	58	50	458	117	1,113
Statewide Total	**33,281**	**44,374**	**78,824**	**105,095**	**5,295**	**13,705**	**12,540**	**32,460**	**529**	**1,371**	**2,508**	**6,492**	**39,106**	**59,449**	**93,873**	**144,047**

Table 4.2.4.7: Total Annual ROG Emission Rate (Cement and Primer)														
	Primer ROG Emissions[6] (tons/year)				Cement ROG Emissions[6] (tons/year)				Total ROG Emissions[7] - No Safety Factor (tons/year)					
	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	0.10	0.20	0.23	0.48	0.32	0.54	0.78	1.29	0.42	0.74	1.16	1.01	1.78	2.79
ALPINE	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02
AMADOR	0.00	0.02	0.00	0.05	0.01	0.05	0.01	0.13	0.01	0.07	0.08	0.02	0.18	0.20
BUTTE	0.02	0.08	0.04	0.20	0.05	0.22	0.13	0.53	0.07	0.30	0.37	0.16	0.73	0.90
CALAVERAS	0.00	0.04	0.00	0.11	0.00	0.12	0.01	0.28	0.00	0.16	0.16	0.01	0.39	0.40
COLUSA	0.00	0.01	0.00	0.02	0.00	0.02	0.01	0.05	0.00	0.03	0.03	0.01	0.07	0.08
CONTRA COSTA	0.07	0.30	0.17	0.73	0.25	0.80	0.59	1.95	0.32	1.10	1.42	0.76	2.68	3.44
DEL NORTE	0.00	0.01	0.00	0.02	0.01	0.02	0.02	0.04	0.01	0.02	0.03	0.02	0.06	0.08
EL DORADO	0.01	0.11	0.02	0.27	0.02	0.30	0.06	0.72	0.03	0.41	0.44	0.08	0.99	1.07
FRESNO	0.07	0.29	0.16	0.71	0.22	0.78	0.54	1.89	0.29	1.07	1.36	0.70	2.60	3.29
GLENN	0.00	0.01	0.00	0.02	0.01	0.02	0.01	0.05	0.01	0.03	0.04	0.02	0.07	0.09
HUMBOLDT	0.00	0.03	0.01	0.06	0.01	0.07	0.04	0.17	0.02	0.09	0.11	0.05	0.23	0.27
IMPERIAL	0.01	0.09	0.03	0.23	0.04	0.25	0.09	0.61	0.05	0.34	0.39	0.11	0.84	0.95
INYO	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.01	0.01	0.03	0.03
KERN	0.04	0.37	0.09	0.90	0.13	0.99	0.31	2.41	0.17	1.36	1.53	0.40	3.32	3.72
KINGS	0.01	0.05	0.01	0.12	0.02	0.13	0.05	0.31	0.03	0.17	0.20	0.06	0.43	0.49
LAKE	0.00	0.03	0.01	0.07	0.01	0.07	0.02	0.18	0.01	0.10	0.11	0.02	0.25	0.27
LASSEN	0.00	0.01	0.00	0.02	0.00	0.03	0.01	0.06	0.00	0.04	0.04	0.01	0.09	0.10
LOS ANGELES	0.65	0.79	1.56	1.91	2.21	2.11	5.30	5.10	2.86	2.90	5.76	6.86	7.01	13.88
MADERA	0.01	0.09	0.01	0.22	0.02	0.24	0.05	0.57	0.02	0.32	0.35	0.06	0.79	0.85
MARIN	0.02	0.05	0.05	0.12	0.07	0.14	0.16	0.33	0.09	0.19	0.27	0.20	0.45	0.65
MARIPOSA	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.06	0.00	0.03	0.03	0.00	0.08	0.08
MENDOCINO	0.00	0.02	0.01	0.06	0.01	0.06	0.03	0.15	0.02	0.09	0.10	0.04	0.21	0.24
MERCED	0.01	0.16	0.03	0.38	0.04	0.42	0.09	1.01	0.05	0.57	0.62	0.12	1.39	1.51
MODOC	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.01	0.00	0.03	0.03
MONO	0.01	0.01	0.02	0.02	0.03	0.02	0.07	0.05	0.04	0.03	0.07	0.10	0.07	0.17
MONTEREY	0.02	0.07	0.05	0.17	0.08	0.19	0.19	0.46	0.10	0.26	0.36	0.24	0.63	0.87
NAPA	0.01	0.04	0.02	0.09	0.03	0.10	0.06	0.24	0.03	0.14	0.17	0.08	0.33	0.41
NEVADA	0.00	0.07	0.01	0.17	0.01	0.18	0.04	0.44	0.02	0.25	0.27	0.05	0.61	0.65

Table 4.2.4.7: Total Annual ROG Emission Rate (Cement and Primer)

County	Primer ROG Emissions[6] (tons/year)				Cement ROG Emissions[6] (tons/year)				Total ROG Emissions[7] - No Safety Factor (tons/year)					
	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ORANGE	0.25	0.59	0.61	1.41	0.86	1.57	2.06	3.77	1.11	2.16	3.28	2.66	5.18	7.85
PLACER	0.02	0.27	0.05	0.65	0.07	0.72	0.17	1.75	0.09	0.99	1.08	0.22	2.40	2.62
PLUMAS	0.00	0.02	0.00	0.04	0.00	0.04	0.01	0.10	0.00	0.06	0.06	0.01	0.14	0.15
RIVERSIDE	0.12	1.59	0.30	3.86	0.42	4.24	1.03	10.32	0.55	5.83	6.38	1.33	14.18	15.51
SACRAMENTO	0.12	0.53	0.29	1.29	0.40	1.42	0.97	3.45	0.52	1.95	2.47	1.26	4.74	6.00
SAN BENITO	0.00	0.02	0.00	0.05	0.01	0.06	0.01	0.13	0.01	0.08	0.08	0.02	0.18	0.20
SAN BERNARDINO	0.13	0.78	0.32	1.89	0.45	2.08	1.08	5.04	0.58	2.85	3.44	1.40	6.93	8.33
SAN DIEGO	0.35	0.70	0.85	1.69	1.21	1.87	2.90	4.52	1.56	2.57	4.13	3.75	6.21	9.96
SAN FRANCISCO	0.06	0.01	0.14	0.03	0.20	0.03	0.47	0.07	0.25	0.04	0.29	0.61	0.10	0.71
SAN JOAQUIN	0.03	0.35	0.08	0.85	0.11	0.94	0.27	2.28	0.15	1.29	1.44	0.35	3.14	3.49
SAN LUIS OBISPO	0.02	0.11	0.04	0.27	0.06	0.29	0.14	0.71	0.08	0.40	0.48	0.18	0.98	1.16
SAN MATEO	0.05	0.08	0.12	0.20	0.17	0.23	0.41	0.54	0.22	0.31	0.54	0.53	0.74	1.28
SANTA BARBARA	0.03	0.07	0.06	0.16	0.09	0.18	0.21	0.44	0.12	0.25	0.37	0.28	0.60	0.88
SANTA CLARA	0.14	0.34	0.34	0.81	0.48	0.90	1.15	2.15	0.62	1.23	1.85	1.49	2.96	4.45
SANTA CRUZ	0.02	0.06	0.04	0.15	0.06	0.17	0.13	0.41	0.07	0.23	0.31	0.17	0.56	0.74
SHASTA	0.01	0.07	0.03	0.17	0.04	0.19	0.09	0.45	0.05	0.26	0.30	0.11	0.62	0.73
SIERRA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.02	0.02
SISKIYOU	0.00	0.02	0.01	0.04	0.01	0.04	0.02	0.11	0.01	0.06	0.07	0.03	0.15	0.17
SOLANO	0.03	0.17	0.06	0.41	0.09	0.45	0.21	1.09	0.12	0.62	0.73	0.28	1.50	1.77
SONOMA	0.03	0.14	0.08	0.34	0.11	0.38	0.27	0.91	0.15	0.52	0.66	0.35	1.25	1.60
STANISLAUS	0.02	0.23	0.06	0.57	0.08	0.63	0.20	1.52	0.11	0.86	0.97	0.26	2.09	2.35
SUTTER	0.01	0.06	0.01	0.15	0.02	0.17	0.04	0.41	0.02	0.23	0.25	0.06	0.56	0.61
TEHAMA	0.00	0.03	0.01	0.07	0.01	0.08	0.02	0.20	0.01	0.11	0.13	0.03	0.27	0.31
TRINITY	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.04	0.00	0.02	0.02	0.00	0.05	0.05
TULARE	0.01	0.13	0.04	0.32	0.05	0.35	0.12	0.86	0.06	0.48	0.55	0.15	1.18	1.33
TUOLUMNE	0.00	0.03	0.00	0.08	0.01	0.09	0.02	0.21	0.01	0.12	0.13	0.02	0.29	0.31
VENTURA	0.05	0.21	0.13	0.51	0.18	0.57	0.44	1.37	0.24	0.78	1.02	0.57	1.89	2.46
YOLO	0.02	0.08	0.04	0.18	0.06	0.20	0.14	0.49	0.08	0.28	0.35	0.18	0.68	0.86
YUBA	0.00	0.07	0.01	0.18	0.01	0.20	0.03	0.49	0.01	0.28	0.29	0.03	0.67	0.70
Statewide Total	**3**	**10**	**6**	**24**	**9**	**26**	**21**	**63**	**11**	**36**	**47**	**28**	**87**	**114**

Table 4.2.4.8: Total Annual ROG Emission Rate with Safety Factor												
	Total ROG Emissions[7] - No Safety Factor (tons/year)						Total ROG Emissions[7] - With Safety Factor (tons/year)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	0.42	0.74	1.16	1.01	1.78	2.79	0.84	1.48	2.32	2.02	3.55	5.58
ALPINE	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.04
AMADOR	0.01	0.07	0.08	0.02	0.18	0.20	0.02	0.15	0.16	0.04	0.36	0.40
BUTTE	0.07	0.30	0.37	0.16	0.73	0.90	0.14	0.60	0.74	0.33	1.47	1.79
CALAVERAS	0.00	0.16	0.16	0.01	0.39	0.40	0.01	0.32	0.33	0.02	0.78	0.80
COLUSA	0.00	0.03	0.03	0.01	0.07	0.08	0.01	0.06	0.07	0.02	0.15	0.17
CONTRA COSTA	0.32	1.10	1.42	0.76	2.68	3.44	0.64	2.21	2.85	1.53	5.36	6.88
DEL NORTE	0.01	0.02	0.03	0.02	0.06	0.08	0.02	0.05	0.07	0.04	0.12	0.16
EL DORADO	0.03	0.41	0.44	0.08	0.99	1.07	0.06	0.82	0.88	0.15	1.99	2.14
FRESNO	0.29	1.07	1.36	0.70	2.60	3.29	0.58	2.13	2.71	1.39	5.20	6.59
GLENN	0.01	0.03	0.04	0.02	0.07	0.09	0.01	0.06	0.07	0.03	0.14	0.17
HUMBOLDT	0.02	0.09	0.11	0.05	0.23	0.27	0.04	0.19	0.23	0.09	0.46	0.55
IMPERIAL	0.05	0.34	0.39	0.11	0.84	0.95	0.09	0.69	0.78	0.23	1.68	1.90
INYO	0.00	0.01	0.01	0.01	0.03	0.03	0.00	0.02	0.03	0.01	0.06	0.07
KERN	0.17	1.36	1.53	0.40	3.32	3.72	0.34	2.72	3.06	0.81	6.63	7.44
KINGS	0.03	0.17	0.20	0.06	0.43	0.49	0.05	0.35	0.40	0.13	0.85	0.98
LAKE	0.01	0.10	0.11	0.02	0.25	0.27	0.02	0.21	0.22	0.04	0.50	0.54
LASSEN	0.00	0.04	0.04	0.01	0.09	0.10	0.01	0.07	0.08	0.02	0.18	0.20
LOS ANGELES	2.86	2.90	5.76	6.86	7.01	13.88	5.72	5.80	11.52	13.73	14.03	27.75
MADERA	0.02	0.32	0.35	0.06	0.79	0.85	0.05	0.65	0.70	0.12	1.58	1.70
MARIN	0.09	0.19	0.27	0.20	0.45	0.65	0.17	0.37	0.54	0.41	0.89	1.30
MARIPOSA	0.00	0.03	0.03	0.00	0.08	0.08	0.00	0.07	0.07	0.01	0.16	0.17
MENDOCINO	0.02	0.09	0.10	0.04	0.21	0.24	0.03	0.17	0.20	0.08	0.41	0.49
MERCED	0.05	0.57	0.62	0.12	1.39	1.51	0.10	1.14	1.24	0.23	2.79	3.02
MODOC	0.00	0.01	0.01	0.00	0.03	0.03	0.00	0.02	0.03	0.01	0.06	0.06
MONO	0.04	0.03	0.07	0.10	0.07	0.17	0.08	0.06	0.14	0.19	0.14	0.33
MONTEREY	0.10	0.26	0.36	0.24	0.63	0.87	0.20	0.52	0.72	0.48	1.27	1.75
NAPA	0.03	0.14	0.17	0.08	0.33	0.41	0.07	0.27	0.34	0.16	0.67	0.83
NEVADA	0.02	0.25	0.27	0.05	0.61	0.65	0.04	0.50	0.54	0.09	1.21	1.31
ORANGE	1.11	2.16	3.28	2.66	5.18	7.85	2.23	4.32	6.55	5.33	10.36	15.69

Table 4.2.4.8: Total Annual ROG Emission Rate with Safety Factor												
	Total ROG Emissions[7] - No Safety Factor (tons/year)						Total ROG Emissions[7] - With Safety Factor (tons/year)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
PLACER	0.09	0.99	1.08	0.22	2.40	2.62	0.19	1.97	2.16	0.44	4.80	5.24
PLUMAS	0.00	0.06	0.06	0.01	0.14	0.15	0.01	0.12	0.12	0.02	0.28	0.30
RIVERSIDE	0.55	5.83	6.38	1.33	14.18	15.51	1.10	11.67	12.76	2.66	28.37	31.03
SACRAMENTO	0.52	1.95	2.47	1.26	4.74	6.00	1.05	3.90	4.95	2.51	9.49	12.00
SAN BENITO	0.01	0.08	0.08	0.02	0.18	0.20	0.01	0.15	0.17	0.04	0.36	0.40
SAN BERNARDINO	0.58	2.85	3.44	1.40	6.93	8.33	1.17	5.71	6.87	2.80	13.86	16.67
SAN DIEGO	1.56	2.57	4.13	3.75	6.21	9.96	3.12	5.14	8.27	7.50	12.42	19.92
SAN FRANCISCO	0.25	0.04	0.29	0.61	0.10	0.71	0.51	0.08	0.59	1.23	0.20	1.43
SAN JOAQUIN	0.15	1.29	1.44	0.35	3.14	3.49	0.29	2.58	2.87	0.70	6.27	6.97
SAN LUIS OBISPO	0.08	0.40	0.48	0.18	0.98	1.16	0.15	0.80	0.95	0.36	1.95	2.31
SAN MATEO	0.22	0.31	0.54	0.53	0.74	1.28	0.45	0.62	1.07	1.07	1.49	2.56
SANTA BARBARA	0.12	0.25	0.37	0.28	0.60	0.88	0.23	0.50	0.73	0.55	1.21	1.76
SANTA CLARA	0.62	1.23	1.85	1.49	2.96	4.45	1.24	2.47	3.71	2.98	5.92	8.90
SANTA CRUZ	0.07	0.23	0.31	0.17	0.56	0.74	0.14	0.47	0.61	0.35	1.13	1.47
SHASTA	0.05	0.26	0.30	0.11	0.62	0.73	0.09	0.51	0.61	0.22	1.24	1.46
SIERRA	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.01	0.02	0.00	0.03	0.04
SISKIYOU	0.01	0.06	0.07	0.03	0.15	0.17	0.02	0.12	0.14	0.05	0.30	0.35
SOLANO	0.12	0.62	0.73	0.28	1.50	1.77	0.23	1.24	1.47	0.55	2.99	3.54
SONOMA	0.15	0.52	0.66	0.35	1.25	1.60	0.29	1.04	1.33	0.70	2.50	3.20
STANISLAUS	0.11	0.86	0.97	0.26	2.09	2.35	0.22	1.72	1.94	0.52	4.19	4.70
SUTTER	0.02	0.23	0.25	0.06	0.56	0.61	0.05	0.46	0.51	0.11	1.12	1.23
TEHAMA	0.01	0.11	0.13	0.03	0.27	0.31	0.03	0.22	0.25	0.06	0.55	0.61
TRINITY	0.00	0.02	0.02	0.00	0.05	0.05	0.00	0.04	0.04	0.01	0.10	0.11
TULARE	0.06	0.48	0.55	0.15	1.18	1.33	0.13	0.97	1.10	0.31	2.36	2.66
TUOLUMNE	0.01	0.12	0.13	0.02	0.29	0.31	0.02	0.24	0.26	0.04	0.57	0.61
VENTURA	0.24	0.78	1.02	0.57	1.89	2.46	0.47	1.57	2.04	1.14	3.78	4.92
YOLO	0.08	0.28	0.35	0.18	0.68	0.86	0.15	0.56	0.71	0.36	1.36	1.72
YUBA	0.01	0.28	0.29	0.03	0.67	0.70	0.03	0.55	0.58	0.07	1.34	1.41
Statewide Total	**11**	**36**	**47**	**28**	**87**	**114**	**23**	**71**	**94**	**55**	**173**	**228**

Table 4.2.4.9: Total Annual Cement Only ROG Rate with Safety Factor												
	Cement Only ROG Emissions (tons/year) - No Saf. Fac.						Cement Only ROG Emissions (tons/year) - With Saf. Fac.					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	0.32	0.54	0.86	0.78	1.29	2.07	0.65	1.08	1.72	1.56	2.59	4.15
ALPINE	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.03
AMADOR	0.01	0.05	0.06	0.01	0.13	0.15	0.01	0.11	0.12	0.03	0.26	0.29
BUTTE	0.05	0.22	0.27	0.13	0.53	0.66	0.10	0.44	0.54	0.25	1.07	1.32
CALAVERAS	0.00	0.12	0.12	0.01	0.28	0.29	0.01	0.23	0.24	0.01	0.57	0.58
COLUSA	0.00	0.02	0.03	0.01	0.05	0.06	0.01	0.04	0.05	0.01	0.11	0.12
CONTRA COSTA	0.25	0.80	1.05	0.59	1.95	2.54	0.49	1.61	2.10	1.18	3.90	5.08
DEL NORTE	0.01	0.02	0.02	0.02	0.04	0.06	0.01	0.04	0.05	0.03	0.09	0.12
EL DORADO	0.02	0.30	0.32	0.06	0.72	0.78	0.05	0.60	0.65	0.12	1.45	1.56
FRESNO	0.22	0.78	1.00	0.54	1.89	2.43	0.45	1.55	2.00	1.07	3.78	4.86
GLENN	0.01	0.02	0.03	0.01	0.05	0.06	0.01	0.04	0.05	0.03	0.10	0.13
HUMBOLDT	0.01	0.07	0.08	0.04	0.17	0.20	0.03	0.14	0.17	0.07	0.33	0.40
IMPERIAL	0.04	0.25	0.29	0.09	0.61	0.70	0.07	0.50	0.57	0.18	1.22	1.40
INYO	0.00	0.01	0.01	0.00	0.02	0.03	0.00	0.02	0.02	0.01	0.04	0.05
KERN	0.13	0.99	1.12	0.31	2.41	2.72	0.26	1.98	2.24	0.62	4.83	5.45
KINGS	0.02	0.13	0.15	0.05	0.31	0.36	0.04	0.25	0.29	0.10	0.62	0.72
LAKE	0.01	0.07	0.08	0.02	0.18	0.20	0.01	0.15	0.16	0.03	0.36	0.40
LASSEN	0.00	0.03	0.03	0.01	0.06	0.07	0.01	0.05	0.06	0.02	0.13	0.15
LOS ANGELES	2.21	2.11	4.32	5.30	5.10	10.41	4.42	4.22	8.64	10.61	10.21	20.81
MADERA	0.02	0.24	0.26	0.05	0.57	0.62	0.04	0.47	0.51	0.09	1.15	1.24
MARIN	0.07	0.14	0.20	0.16	0.33	0.48	0.13	0.27	0.40	0.32	0.65	0.97
MARIPOSA	0.00	0.02	0.03	0.00	0.06	0.06	0.00	0.05	0.05	0.01	0.12	0.12
MENDOCINO	0.01	0.06	0.07	0.03	0.15	0.18	0.02	0.12	0.15	0.06	0.30	0.36
MERCED	0.04	0.42	0.45	0.09	1.01	1.10	0.07	0.83	0.91	0.18	2.03	2.21
MODOC	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.02	0.02	0.01	0.04	0.05
MONO	0.03	0.02	0.05	0.07	0.05	0.13	0.06	0.04	0.10	0.15	0.10	0.25
MONTEREY	0.08	0.19	0.27	0.19	0.46	0.65	0.16	0.38	0.54	0.37	0.92	1.29
NAPA	0.03	0.10	0.13	0.06	0.24	0.30	0.05	0.20	0.25	0.12	0.48	0.61
NEVADA	0.01	0.18	0.20	0.04	0.44	0.48	0.03	0.37	0.40	0.07	0.88	0.95

Table 4.2.4.9: Total Annual Cement Only ROG Rate with Safety Factor

County	Cement Only ROG Emissions (tons/year) - No Saf. Fac.						Cement Only ROG Emissions (tons/year) - With Saf. Fac.					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ORANGE	0.86	1.57	2.43	2.06	3.77	5.83	1.72	3.15	4.87	4.12	7.54	11.66
PLACER	0.07	0.72	0.79	0.17	1.75	1.92	0.14	1.44	1.58	0.34	3.49	3.83
PLUMAS	0.00	0.04	0.04	0.01	0.10	0.11	0.01	0.08	0.09	0.01	0.20	0.22
RIVERSIDE	0.42	4.24	4.67	1.03	10.32	11.35	0.85	8.49	9.34	2.05	20.65	22.70
SACRAMENTO	0.40	1.42	1.82	0.97	3.45	4.42	0.81	2.84	3.65	1.94	6.90	8.85
SAN BENITO	0.01	0.06	0.06	0.01	0.13	0.15	0.01	0.11	0.12	0.03	0.26	0.29
SAN BERNARDINO	0.45	2.08	2.53	1.08	5.04	6.13	0.90	4.15	5.06	2.16	10.09	12.25
SAN DIEGO	1.21	1.87	3.08	2.90	4.52	7.42	2.41	3.74	6.16	5.80	9.04	14.84
SAN FRANCISCO	0.20	0.03	0.23	0.47	0.07	0.55	0.39	0.06	0.45	0.95	0.14	1.09
SAN JOAQUIN	0.11	0.94	1.05	0.27	2.28	2.55	0.23	1.88	2.10	0.54	4.56	5.10
SAN LUIS OBISPO	0.06	0.29	0.35	0.14	0.71	0.85	0.12	0.58	0.70	0.28	1.42	1.70
SAN MATEO	0.17	0.23	0.40	0.41	0.54	0.95	0.35	0.45	0.80	0.83	1.08	1.91
SANTA BARBARA	0.09	0.18	0.27	0.21	0.44	0.65	0.18	0.36	0.54	0.43	0.88	1.31
SANTA CLARA	0.48	0.90	1.38	1.15	2.15	3.30	0.96	1.80	2.75	2.30	4.30	6.61
SANTA CRUZ	0.06	0.17	0.23	0.13	0.41	0.54	0.11	0.34	0.45	0.27	0.82	1.09
SHASTA	0.04	0.19	0.22	0.09	0.45	0.54	0.07	0.37	0.44	0.17	0.90	1.08
SIERRA	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.03
SISKIYOU	0.01	0.04	0.05	0.02	0.11	0.13	0.02	0.09	0.11	0.04	0.22	0.26
SOLANO	0.09	0.45	0.54	0.21	1.09	1.30	0.18	0.90	1.08	0.43	2.18	2.60
SONOMA	0.11	0.38	0.49	0.27	0.91	1.18	0.22	0.76	0.98	0.54	1.82	2.36
STANISLAUS	0.08	0.63	0.71	0.20	1.52	1.72	0.17	1.25	1.42	0.40	3.05	3.45
SUTTER	0.02	0.17	0.19	0.04	0.41	0.45	0.04	0.33	0.37	0.09	0.81	0.90
TEHAMA	0.01	0.08	0.09	0.02	0.20	0.22	0.02	0.16	0.18	0.05	0.40	0.45
TRINITY	0.00	0.02	0.02	0.00	0.04	0.04	0.00	0.03	0.03	0.01	0.07	0.08
TULARE	0.05	0.35	0.40	0.12	0.86	0.98	0.10	0.70	0.80	0.24	1.71	1.95
TUOLUMNE	0.01	0.09	0.09	0.02	0.21	0.22	0.01	0.17	0.19	0.03	0.42	0.45
VENTURA	0.18	0.57	0.75	0.44	1.37	1.82	0.37	1.14	1.51	0.88	2.75	3.63
YOLO	0.06	0.20	0.26	0.14	0.49	0.63	0.12	0.41	0.52	0.28	0.99	1.27
YUBA	0.01	0.20	0.21	0.03	0.49	0.51	0.02	0.40	0.42	0.05	0.97	1.03
Statewide Total	**9**	**26**	**35**	**21**	**63**	**84**	**18**	**52**	**70**	**43**	**126**	**169**

Table 4.2.4.10: Total Daily ROG Emission Rate with Safety Factor												
	Total ROG Emissions7 - No Safety Factor (lbs/day)						Total ROG Emissions7 - With Safety Factor (lbs/day)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	4.28	7.54	11.82	10.32	18.13	28.45	8.55	15.09	23.64	20.64	36.26	56.90
ALPINE	0.03	0.05	0.08	0.07	0.12	0.20	0.06	0.10	0.16	0.14	0.25	0.39
AMADOR	0.08	0.76	0.84	0.19	1.85	2.04	0.16	1.52	1.68	0.38	3.70	4.08
BUTTE	0.69	3.08	3.77	1.66	7.49	9.15	1.38	6.16	7.54	3.32	14.99	18.30
CALAVERAS	0.04	1.63	1.67	0.09	3.98	4.07	0.08	3.27	3.35	0.19	7.95	8.14
COLUSA	0.04	0.31	0.35	0.10	0.76	0.86	0.08	0.62	0.70	0.20	1.52	1.71
CONTRA COSTA	3.25	11.27	14.52	7.79	27.34	35.12	6.50	22.53	29.03	15.58	54.67	70.25
DEL NORTE	0.09	0.25	0.34	0.22	0.61	0.82	0.18	0.50	0.68	0.43	1.21	1.65
EL DORADO	0.32	4.18	4.50	0.78	10.14	10.92	0.65	8.36	9.00	1.55	20.29	21.84
FRESNO	2.95	10.89	13.84	7.09	26.51	33.60	5.90	21.78	27.68	14.19	53.01	67.20
GLENN	0.07	0.30	0.37	0.17	0.72	0.89	0.14	0.59	0.73	0.33	1.45	1.78
HUMBOLDT	0.20	0.96	1.15	0.47	2.32	2.79	0.39	1.91	2.31	0.94	4.65	5.59
IMPERIAL	0.48	3.52	4.00	1.16	8.56	9.72	0.95	7.04	7.99	2.32	17.12	19.44
INYO	0.02	0.13	0.15	0.06	0.30	0.36	0.05	0.25	0.30	0.11	0.60	0.71
KERN	1.71	13.90	15.61	4.11	33.84	37.95	3.42	27.81	31.23	8.22	67.69	75.91
KINGS	0.27	1.78	2.05	0.64	4.34	4.98	0.53	3.57	4.10	1.28	8.69	9.97
LAKE	0.09	1.05	1.14	0.23	2.55	2.78	0.19	2.10	2.29	0.46	5.10	5.55
LASSEN	0.05	0.37	0.42	0.11	0.91	1.02	0.10	0.75	0.84	0.23	1.81	2.04
LOS ANGELES	29.20	29.58	58.78	70.03	71.56	141.59	58.40	59.15	117.55	140.06	143.12	283.19
MADERA	0.25	3.31	3.57	0.61	8.06	8.67	0.50	6.63	7.13	1.21	16.12	17.33
MARIN	0.87	1.90	2.77	2.08	4.56	6.65	1.75	3.79	5.54	4.17	9.13	13.29
MARIPOSA	0.02	0.33	0.35	0.05	0.81	0.86	0.04	0.67	0.71	0.10	1.62	1.71
MENDOCINO	0.16	0.87	1.03	0.39	2.11	2.50	0.33	1.74	2.07	0.78	4.22	4.99
MERCED	0.49	5.84	6.33	1.19	14.21	15.40	0.99	11.68	12.67	2.38	28.43	30.80
MODOC	0.02	0.12	0.14	0.04	0.28	0.32	0.04	0.23	0.27	0.09	0.56	0.65
MONO	0.41	0.30	0.71	0.99	0.72	1.71	0.82	0.59	1.41	1.98	1.43	3.41
MONTEREY	1.04	2.66	3.70	2.47	6.46	8.92	2.07	5.33	7.40	4.94	12.91	17.85
NAPA	0.34	1.40	1.74	0.81	3.40	4.21	0.68	2.80	3.48	1.63	6.80	8.42
NEVADA	0.20	2.57	2.77	0.48	6.19	6.66	0.39	5.14	5.53	0.95	12.37	13.32

Table 4.2.4.10: Total Daily ROG Emission Rate with Safety Factor												
	Total ROG Emissions7 - No Safety Factor (lbs/day)						Total ROG Emissions7 - With Safety Factor (lbs/day)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ORANGE	11.37	22.06	33.43	27.18	52.88	80.05	22.73	44.12	66.85	54.36	105.75	160.11
PLACER	0.94	10.06	11.01	2.26	24.47	26.73	1.89	20.12	22.01	4.53	48.94	53.46
PLUMAS	0.04	0.59	0.63	0.09	1.43	1.52	0.08	1.18	1.26	0.18	2.86	3.05
RIVERSIDE	5.60	59.52	65.11	13.56	144.74	158.30	11.19	119.03	130.23	27.12	289.49	316.61
SACRAMENTO	5.34	19.90	25.24	12.81	48.41	61.22	10.67	39.80	50.47	25.62	96.82	122.44
SAN BENITO	0.08	0.77	0.85	0.18	1.84	2.02	0.15	1.54	1.70	0.36	3.68	4.05
SAN BERNARDINO	5.96	29.11	35.07	14.29	70.74	85.03	11.93	58.22	70.15	28.59	141.47	170.06
SAN DIEGO	15.94	26.24	42.19	38.28	63.36	101.64	31.88	52.49	84.37	76.56	126.72	203.28
SAN FRANCISCO	2.58	0.42	3.01	6.26	1.01	7.28	5.17	0.85	6.02	12.53	2.03	14.55
SAN JOAQUIN	1.50	13.15	14.65	3.57	32.00	35.57	2.99	26.30	29.30	7.14	64.00	71.14
SAN LUIS OBISPO	0.77	4.10	4.87	1.85	9.95	11.80	1.54	8.20	9.74	3.70	19.90	23.59
SAN MATEO	2.29	3.17	5.46	5.46	7.59	13.05	4.58	6.34	10.92	10.92	15.18	26.10
SANTA BARBARA	1.18	2.55	3.73	2.83	6.16	8.99	2.37	5.09	7.46	5.66	12.32	17.98
SANTA CLARA	6.32	12.60	18.92	15.21	30.18	45.39	12.63	25.20	37.83	30.41	60.36	90.78
SANTA CRUZ	0.74	2.39	3.12	1.76	5.74	7.50	1.47	4.77	6.24	3.52	11.48	15.01
SHASTA	0.47	2.61	3.09	1.14	6.33	7.47	0.95	5.23	6.17	2.28	12.67	14.94
SIERRA	0.01	0.07	0.08	0.02	0.17	0.19	0.02	0.14	0.16	0.05	0.34	0.38
SISKIYOU	0.11	0.62	0.74	0.27	1.51	1.78	0.22	1.25	1.47	0.54	3.02	3.56
SOLANO	1.17	6.32	7.49	2.82	15.26	18.08	2.35	12.63	14.98	5.63	30.52	36.16
SONOMA	1.48	5.30	6.79	3.58	12.75	16.33	2.97	10.60	13.57	7.16	25.50	32.66
STANISLAUS	1.10	8.79	9.89	2.63	21.37	24.00	2.20	17.57	19.77	5.26	42.74	48.00
SUTTER	0.24	2.34	2.58	0.57	5.70	6.27	0.47	4.69	5.16	1.13	11.40	12.53
TEHAMA	0.14	1.15	1.28	0.33	2.79	3.11	0.27	2.29	2.57	0.65	5.58	6.23
TRINITY	0.01	0.21	0.23	0.03	0.51	0.54	0.03	0.42	0.45	0.07	1.02	1.09
TULARE	0.65	4.94	5.59	1.58	12.02	13.60	1.31	9.87	11.18	3.15	24.04	27.19
TUOLUMNE	0.09	1.21	1.30	0.22	2.92	3.14	0.18	2.42	2.61	0.43	5.84	6.27
VENTURA	2.42	8.01	10.43	5.82	19.27	25.09	4.84	16.02	20.86	11.65	38.53	50.18
YOLO	0.77	2.85	3.61	1.85	6.92	8.77	1.53	5.69	7.22	3.70	13.85	17.55
YUBA	0.15	2.81	2.96	0.35	6.83	7.18	0.30	5.62	5.91	0.70	13.66	14.36
Statewide Total	**117**	**365**	**482**	**281**	**884**	**1,165**	**234**	**729**	**964**	**562**	**1,767**	**2,330**

Table 4.2.4.11: Total Daily Cement Only ROG Rate with Safety Factor												
	Cement Only ROG Emissions (lbs/day) - No Safety Factor						Cement Only ROG Emissions (lbs/day) - With Safety Factor					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	3.31	5.49	8.80	7.98	13.19	21.17	6.61	10.98	17.59	15.95	26.39	42.34
ALPINE	0.02	0.04	0.06	0.05	0.09	0.15	0.05	0.07	0.12	0.11	0.18	0.29
AMADOR	0.06	0.55	0.61	0.15	1.35	1.49	0.12	1.11	1.23	0.29	2.69	2.99
BUTTE	0.53	2.24	2.77	1.28	5.45	6.73	1.07	4.48	5.55	2.56	10.91	13.47
CALAVERAS	0.03	1.19	1.22	0.07	2.89	2.97	0.06	2.38	2.44	0.14	5.79	5.93
COLUSA	0.03	0.23	0.26	0.08	0.55	0.63	0.06	0.45	0.52	0.15	1.10	1.26
CONTRA COSTA	2.51	8.20	10.71	6.02	19.89	25.91	5.03	16.40	21.42	12.04	39.79	51.82
DEL NORTE	0.07	0.18	0.25	0.17	0.44	0.61	0.14	0.36	0.50	0.33	0.88	1.22
EL DORADO	0.25	3.04	3.29	0.60	7.38	7.98	0.50	6.08	6.58	1.20	14.76	15.96
FRESNO	2.28	7.92	10.20	5.48	19.29	24.77	4.56	15.85	20.41	10.96	38.58	49.54
GLENN	0.05	0.22	0.27	0.13	0.53	0.65	0.11	0.43	0.54	0.26	1.05	1.31
HUMBOLDT	0.15	0.70	0.85	0.36	1.69	2.06	0.30	1.39	1.70	0.73	3.38	4.11
IMPERIAL	0.37	2.56	2.93	0.90	6.23	7.12	0.74	5.12	5.86	1.79	12.46	14.25
INYO	0.02	0.09	0.11	0.04	0.22	0.26	0.04	0.18	0.22	0.09	0.43	0.52
KERN	1.32	10.12	11.44	3.18	24.63	27.80	2.65	20.24	22.88	6.35	49.26	55.61
KINGS	0.21	1.30	1.50	0.50	3.16	3.66	0.41	2.60	3.01	0.99	6.32	7.31
LAKE	0.07	0.76	0.84	0.18	1.86	2.03	0.15	1.53	1.67	0.35	3.71	4.06
LASSEN	0.04	0.27	0.31	0.09	0.66	0.75	0.07	0.54	0.62	0.18	1.32	1.50
LOS ANGELES	22.57	21.52	44.09	54.12	52.08	106.20	45.13	43.05	88.18	108.24	104.15	212.40
MADERA	0.19	2.41	2.61	0.47	5.87	6.33	0.39	4.82	5.21	0.94	11.73	12.67
MARIN	0.67	1.38	2.06	1.61	3.32	4.93	1.35	2.76	4.11	3.22	6.64	9.86
MARIPOSA	0.02	0.24	0.26	0.04	0.59	0.63	0.03	0.48	0.52	0.07	1.18	1.25
MENDOCINO	0.13	0.63	0.76	0.30	1.53	1.83	0.25	1.27	1.52	0.60	3.07	3.67
MERCED	0.38	4.25	4.63	0.92	10.34	11.26	0.76	8.50	9.26	1.84	20.69	22.52

Table 4.2.4.11: Total Daily Cement Only ROG Rate with Safety Factor												
	Cement Only ROG Emissions (lbs/day) - No Safety Factor						Cement Only ROG Emissions (lbs/day) - With Safety Factor					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
MODOC	0.01	0.09	0.10	0.03	0.20	0.24	0.03	0.17	0.20	0.07	0.41	0.48
MONO	0.32	0.21	0.53	0.76	0.52	1.29	0.64	0.43	1.06	1.53	1.04	2.57
MONTEREY	0.80	1.94	2.74	1.91	4.70	6.61	1.60	3.88	5.48	3.82	9.39	13.21
NAPA	0.26	1.02	1.28	0.63	2.47	3.10	0.52	2.04	2.56	1.26	4.95	6.20
NEVADA	0.15	1.87	2.02	0.37	4.50	4.87	0.30	3.74	4.04	0.74	9.00	9.74
ORANGE	8.78	16.05	24.84	21.00	38.48	59.48	17.57	32.11	49.68	42.01	76.96	118.97
PLACER	0.73	7.32	8.05	1.75	17.81	19.55	1.46	14.64	16.10	3.50	35.61	39.11
PLUMAS	0.03	0.43	0.46	0.07	1.04	1.11	0.06	0.86	0.92	0.14	2.08	2.22
RIVERSIDE	4.32	43.31	47.64	10.48	105.33	115.81	8.65	86.62	95.27	20.96	210.67	231.63
SACRAMENTO	4.12	14.48	18.61	9.90	35.23	45.13	8.25	28.97	37.21	19.80	70.46	90.26
SAN BENITO	0.06	0.56	0.62	0.14	1.34	1.48	0.12	1.12	1.24	0.28	2.68	2.96
SAN BERNARDINO	4.61	21.18	25.79	11.05	51.48	62.52	9.22	42.37	51.59	22.09	102.95	125.05
SAN DIEGO	12.32	19.10	31.42	29.58	46.11	75.69	24.64	38.20	62.84	59.17	92.22	151.38
SAN FRANCISCO	2.00	0.31	2.31	4.84	0.74	5.58	3.99	0.62	4.61	9.68	1.47	11.15
SAN JOAQUIN	1.16	9.57	10.73	2.76	23.29	26.04	2.31	19.14	21.45	5.51	46.58	52.09
SAN LUIS OBISPO	0.60	2.98	3.58	1.43	7.24	8.67	1.19	5.96	7.16	2.86	14.48	17.34
SAN MATEO	1.77	2.31	4.08	4.22	5.52	9.74	3.54	4.62	8.16	8.44	11.05	19.48
SANTA BARBARA	0.91	1.85	2.77	2.19	4.48	6.67	1.83	3.71	5.54	4.37	8.97	13.34
SANTA CLARA	4.88	9.17	14.05	11.75	21.96	33.72	9.76	18.34	28.10	23.50	43.93	67.43
SANTA CRUZ	0.57	1.74	2.30	1.36	4.18	5.54	1.14	3.47	4.61	2.72	8.36	11.08
SHASTA	0.37	1.90	2.27	0.88	4.61	5.49	0.73	3.80	4.54	1.76	9.22	10.98
SIERRA	0.01	0.05	0.06	0.02	0.12	0.14	0.02	0.10	0.12	0.04	0.24	0.28
SISKIYOU	0.09	0.45	0.54	0.21	1.10	1.31	0.17	0.91	1.08	0.41	2.20	2.61
SOLANO	0.91	4.60	5.50	2.18	11.11	13.28	1.82	9.19	11.01	4.35	22.21	26.56
SONOMA	1.15	3.86	5.00	2.77	9.28	12.04	2.29	7.72	10.01	5.53	18.56	24.09

Table 4.2.4.11: Total Daily Cement Only ROG Rate with Safety Factor												
	Cement Only ROG Emissions (lbs/day) - No Safety Factor						Cement Only ROG Emissions (lbs/day) - With Safety Factor					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
STANISLAUS	0.85	6.39	7.24	2.03	15.55	17.58	1.70	12.79	14.49	4.06	31.10	35.16
SUTTER	0.18	1.71	1.89	0.44	4.15	4.59	0.37	3.41	3.78	0.87	8.30	9.17
TEHAMA	0.11	0.83	0.94	0.25	2.03	2.28	0.21	1.67	1.88	0.50	4.06	4.56
TRINITY	0.01	0.15	0.17	0.03	0.37	0.40	0.02	0.31	0.33	0.05	0.74	0.80
TULARE	0.51	3.59	4.10	1.22	8.75	9.97	1.01	7.18	8.20	2.44	17.49	19.93
TUOLUMNE	0.07	0.88	0.95	0.17	2.13	2.29	0.14	1.76	1.90	0.33	4.25	4.58
VENTURA	1.87	5.83	7.70	4.50	14.02	18.52	3.74	11.66	15.40	9.00	28.04	37.04
YOLO	0.59	2.07	2.66	1.43	5.04	6.47	1.19	4.14	5.33	2.86	10.08	12.94
YUBA	0.11	2.04	2.16	0.27	4.97	5.24	0.23	4.09	4.32	0.54	9.94	10.48
Statewide Total	**91**	**265**	**356**	**217**	**643**	**860**	**181**	**531**	**712**	**435**	**1,286**	**1,721**

Table 4.2.4.12: Comparison of Annual County Emissions to the Most Restrictive District Threshold

County	Annual Summary (tons/year)								Most Restrictive Annual Standard (tons/year)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
ALAMEDA	0.9	1.7	1.2	2.3	2.1	4.1	2.8	5.6	15								
ALPINE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-								
AMADOR	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.4	25								
BUTTE	0.3	0.5	0.4	0.7	0.7	1.3	0.9	1.8	-								
CALAVERAS	0.1	0.2	0.2	0.3	0.3	0.6	0.4	0.8	10								
COLUSA	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	10								
CONTRA COSTA	1.0	2.1	1.4	2.8	2.5	5.1	3.4	6.9	15								
DEL NORTE	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	-								
EL DORADO	0.3	0.6	0.4	0.9	0.8	1.6	1.1	2.1	-								
FRESNO	1.0	2.0	1.4	2.7	2.4	4.9	3.3	6.6	10								
GLENN	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	-								
HUMBOLDT	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.5	-								
IMPERIAL	0.3	0.6	0.4	0.8	0.7	1.4	1.0	1.9	10								
INYO	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	-								
KERN	1.1	2.2	1.5	3.1	2.7	5.4	3.7	7.4	25								
KINGS	0.1	0.3	0.2	0.4	0.4	0.7	0.5	1.0	10								
LAKE	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.5	-								
LASSEN	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	-								
LOS ANGELES	4.3	8.6	5.8	11.5	10.4	20.8	13.9	27.8	25								Y
MADERA	0.3	0.5	0.3	0.7	0.6	1.2	0.8	1.7	10								
MARIN	0.2	0.4	0.3	0.5	0.5	1.0	0.7	1.3	15								
MARIPOSA	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	100								
MENDOCINO	0.1	0.1	0.1	0.2	0.2	0.4	0.2	0.5	40								

Table 4.2.4.12: Comparison of Annual County Emissions to the Most Restrictive District Threshold																	
	Annual Summary (tons/year)								Most Restrictive Annual Standard (tons/year)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
County	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
MERCED	0.5	0.9	0.6	1.2	1.1	2.2	1.5	3.0	10								
MODOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	250								
MONO	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.3	-								
MONTEREY	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	-								
NAPA	0.1	0.3	0.2	0.3	0.3	0.6	0.4	0.8	15								
NEVADA	0.2	0.4	0.3	0.5	0.5	1.0	0.7	1.3	50								
ORANGE	2.4	4.9	3.3	6.6	5.8	11.7	7.8	15.7	-								
PLACER	0.8	1.6	1.1	2.2	1.9	3.8	2.6	5.2	-								
PLUMAS	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.3	50								
RIVERSIDE	4.7	9.3	6.4	12.8	11.3	22.7	15.5	31.0	10				Y	Y	Y	Y	Y
SACRAMENTO	1.8	3.6	2.5	4.9	4.4	8.8	6.0	12.0	-								
SAN BENITO	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.4	-								
SAN BERNARDINO	2.5	5.1	3.4	6.9	6.1	12.3	8.3	16.7	10						Y		Y
SAN DIEGO	3.1	6.2	4.1	8.3	7.4	14.8	10.0	19.9	-								
SAN FRANCISCO	0.2	0.5	0.3	0.6	0.5	1.1	0.7	1.4	15								
SAN JOAQUIN	1.1	2.1	1.4	2.9	2.6	5.1	3.5	7.0	10								
SAN LUIS OBISPO	0.4	0.7	0.5	1.0	0.8	1.7	1.2	2.3	10								
SAN MATEO	0.4	0.8	0.5	1.1	1.0	1.9	1.3	2.6	15								
SANTA BARBARA	0.3	0.5	0.4	0.7	0.7	1.3	0.9	1.8	-								
SANTA CLARA	1.4	2.8	1.9	3.7	3.3	6.6	4.4	8.9	15								
SANTA CRUZ	0.2	0.5	0.3	0.6	0.5	1.1	0.7	1.5	-								
SHASTA	0.2	0.4	0.3	0.6	0.5	1.1	0.7	1.5	-								
SIERRA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40								
SISKIYOU	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.3	15								

Table 4.2.4.12: Comparison of Annual County Emissions to the Most Restrictive District Threshold

County	Annual Summary (tons/year)								Most Restrictive Annual Standard (tons/year)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
SOLANO	0.5	1.1	0.7	1.5	1.3	2.6	1.8	3.5	25								
SONOMA	0.5	1.0	0.7	1.3	1.2	2.4	1.6	3.2	15								
STANISLAUS	0.7	1.4	1.0	1.9	1.7	3.4	2.4	4.7	10								
SUTTER	0.2	0.4	0.3	0.5	0.4	0.9	0.6	1.2	-								
TEHAMA	0.1	0.2	0.1	0.3	0.2	0.4	0.3	0.6	10								
TRINITY	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	-								
TULARE	0.4	0.8	0.5	1.1	1.0	2.0	1.3	2.7	10								
TUOLUMNE	0.1	0.2	0.1	0.3	0.2	0.4	0.3	0.6	100								
VENTURA	0.8	1.5	1.0	2.0	1.8	3.6	2.5	4.9	5								
YOLO	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	25								
YUBA	0.2	0.4	0.3	0.6	0.5	1.0	0.7	1.4	-								
Statewide Total	**35**	**70**	**47**	**94**	**84**	**169**	**114**	**228**									

Table 4.2.4.13: Comparison of Daily County Emissions to the Most Restrictive District Threshold																	
	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max					Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer		Threshold	Cement Only		Cement + Primer		Cement Only		Cement + Primer	
County	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
ALAMEDA	8.8	17.6	11.8	23.6	21.2	42.3	28.5	56.9	80								
ALPINE	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.4	150								
AMADOR	0.6	1.2	0.8	1.7	1.5	3.0	2.0	4.1	-								
BUTTE	2.8	5.5	3.8	7.5	6.7	13.5	9.2	18.3	25								
CALAVERAS	1.2	2.4	1.7	3.3	3.0	5.9	4.1	8.1	-								
COLUSA	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	-								
CONTRA COSTA	10.7	21.4	14.5	29.0	25.9	51.8	35.1	70.2	80								
DEL NORTE	0.3	0.5	0.3	0.7	0.6	1.2	0.8	1.6	-								
EL DORADO	3.3	6.6	4.5	9.0	8.0	16.0	10.9	21.8	82								
FRESNO	10.2	20.4	13.8	27.7	24.8	49.5	33.6	67.2	-								
GLENN	0.3	0.5	0.4	0.7	0.7	1.3	0.9	1.8	25								
HUMBOLDT	0.8	1.7	1.2	2.3	2.1	4.1	2.8	5.6	-								
IMPERIAL	2.9	5.9	4.0	8.0	7.1	14.2	9.7	19.4	55								
INYO	0.1	0.2	0.1	0.3	0.3	0.5	0.4	0.7	150								
KERN	11.4	22.9	15.6	31.2	27.8	55.6	38.0	75.9	137								
KINGS	1.5	3.0	2.1	4.1	3.7	7.3	5.0	10.0	-								
LAKE	0.8	1.7	1.1	2.3	2.0	4.1	2.8	5.6	150								
LASSEN	0.3	0.6	0.4	0.8	0.7	1.5	1.0	2.0	150								
LOS ANGELES	44.1	88.2	58.8	117.6	106.2	212.4	141.6	283.2	55		Y	Y	Y	Y	Y	Y	Y
MADERA	2.6	5.2	3.6	7.1	6.3	12.7	8.7	17.3	-								
MARIN	2.1	4.1	2.8	5.5	4.9	9.9	6.6	13.3	80								
MARIPOSA	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	-								
MENDOCINO	0.8	1.5	1.0	2.1	1.8	3.7	2.5	5.0	-								
MERCED	4.6	9.3	6.3	12.7	11.3	22.5	15.4	30.8	-								
MODOC	0.1	0.2	0.1	0.3	0.2	0.5	0.3	0.6	250								

Table 4.2.4.13: Comparison of Daily County Emissions to the Most Restrictive District Threshold

County	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max					Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer		Threshold	Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
MONO	0.5	1.1	0.7	1.4	1.3	2.6	1.7	3.4	150								
MONTEREY	2.7	5.5	3.7	7.4	6.6	13.2	8.9	17.8	82								
NAPA	1.3	2.6	1.7	3.5	3.1	6.2	4.2	8.4	80								
NEVADA	2.0	4.0	2.8	5.5	4.9	9.7	6.7	13.3	137								
ORANGE	24.8	49.7	33.4	66.9	59.5	119.0	80.1	160.1	55				Y	Y	Y	Y	Y
PLACER	8.1	16.1	11.0	22.0	19.6	39.1	26.7	53.5	82								
PLUMAS	0.5	0.9	0.6	1.3	1.1	2.2	1.5	3.0	137								
RIVERSIDE	47.6	95.3	65.1	130.2	115.8	231.6	158.3	316.6	10	Y	Y	Y	Y	Y	Y	Y	Y
SACRAMENTO	18.6	37.2	25.2	50.5	45.1	90.3	61.2	122.4	65						Y		Y
SAN BENITO	0.6	1.2	0.8	1.7	1.5	3.0	2.0	4.0	82								
SAN BERNARDINO	25.8	51.6	35.1	70.1	62.5	125.0	85.0	170.1	55				Y	Y	Y	Y	Y
SAN DIEGO	31.4	62.8	42.2	84.4	75.7	151.4	101.6	203.3	250								
SAN FRANCISCO	2.3	4.6	3.0	6.0	5.6	11.2	7.3	14.6	80								
SAN JOAQUIN	10.7	21.5	14.6	29.3	26.0	52.1	35.6	71.1	-								
SAN LUIS OBISPO	3.6	7.2	4.9	9.7	8.7	17.3	11.8	23.6	10						Y	Y	Y
SAN MATEO	4.1	8.2	5.5	10.9	9.7	19.5	13.0	26.1	80								
SANTA BARBARA	2.8	5.5	3.7	7.5	6.7	13.3	9.0	18.0	25								
SANTA CLARA	14.1	28.1	18.9	37.8	33.7	67.4	45.4	90.8	80								Y
SANTA CRUZ	2.3	4.6	3.1	6.2	5.5	11.1	7.5	15.0	82								
SHASTA	2.3	4.5	3.1	6.2	5.5	11.0	7.5	14.9	25								
SIERRA	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.4	-								
SISKIYOU	0.5	1.1	0.7	1.5	1.3	2.6	1.8	3.6	80								
SOLANO	5.5	11.0	7.5	15.0	13.3	26.6	18.1	36.2	-								
SONOMA	5.0	10.0	6.8	13.6	12.0	24.1	16.3	32.7	80								
STANISLAUS	7.2	14.5	9.9	19.8	17.6	35.2	24.0	48.0	-								
SUTTER	1.9	3.8	2.6	5.2	4.6	9.2	6.3	12.5	25								
TEHAMA	0.9	1.9	1.3	2.6	2.3	4.6	3.1	6.2	-								

Table 4.2.4.13: Comparison of Daily County Emissions to the Most Restrictive District Threshold																	
	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max					Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer		Threshold	Cement Only		Cement + Primer		Cement Only		Cement + Primer	
County	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**lbs/day**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**
TRINITY	0.2	0.3	0.2	0.5	0.4	0.8	0.5	1.1	-								
TULARE	4.1	8.2	5.6	11.2	10.0	19.9	13.6	27.2	-								
TUOLUMNE	1.0	1.9	1.3	2.6	2.3	4.6	3.1	6.3	1000								
VENTURA	7.7	15.4	10.4	20.9	18.5	37.0	25.1	50.2	-								
YOLO	2.7	5.3	3.6	7.2	6.5	12.9	8.8	17.5	-								
YUBA	2.2	4.3	3.0	5.9	5.2	10.5	7.2	14.4	25								
Statewide Total	**356**	**712**	**482**	**964**	**860**	**1,721**	**1,165**	**2,330**									

Y - Indicates a standard is exceeded

Table 4.2.4.14: Comparison of Annual District Emissions to the Most Restrictive District Threshold

Air District	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
Amador County APCD	0.6	1.2	0.8	1.7	1.5	3.0	2.0	4.1	-								
Bay Area AQMD	53.8	107.6	72.5	145.0	129.5	259.0	174.6	349.1	80		Y		Y	Y	Y	Y	Y
Butte County AQMD	2.8	5.5	3.8	7.5	6.7	13.5	9.2	18.3	25								
Calaveras	1.2	2.4	1.7	3.3	3.0	5.9	4.1	8.1	-								
Colusa	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	-								
El Dorado County APCD	3.3	6.6	4.5	9.0	8.0	16.0	10.9	21.8	82								
Feather River AQMD	4.0	8.1	5.5	11.1	9.8	19.7	13.4	26.9	25								Y
Glenn	0.3	0.5	0.4	0.7	0.7	1.3	0.9	1.8	25								
Great Basin	0.7	1.4	0.9	1.9	1.7	3.4	2.3	4.5	150								
Imperial County APCD	2.9	5.9	4.0	8.0	7.1	14.2	9.7	19.4	55								
Kern County APCD	11.4	22.9	15.6	31.2	27.8	55.6	38.0	75.9	137								
Lake County AQMD	0.8	1.7	1.1	2.3	2.0	4.1	2.8	5.6	150								
Lassen	0.3	0.6	0.4	0.8	0.7	1.5	1.0	2.0	150								
Mariposa County APCD	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	-								
Mendocino County AQMD	0.8	1.5	1.0	2.1	1.8	3.7	2.5	5.0	-								
Modoc County APCD	0.1	0.2	0.1	0.3	0.2	0.5	0.3	0.6	250								
Mojave Desert South Coast AQMD	73.4	146.9	100.2	200.4	178.3	356.7	243.3	486.7	10	Y	Y	Y	Y	Y	Y	Y	Y
Monterey Bay Unified APCD	5.7	11.3	7.7	15.3	13.6	27.3	18.5	36.9	82								
North Coast Unified AQMD	1.3	2.5	1.7	3.4	3.1	6.1	4.2	8.3	-								
Northern Sierra AQMD	2.5	5.1	3.5	6.9	6.1	12.2	8.4	16.8	137								
Placer County APCD	8.1	16.1	11.0	22.0	19.6	39.1	26.7	53.5	82								

Table 4.2.4.14: Comparison of Annual District Emissions to the Most Restrictive District Threshold																	
	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
Air District	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
Sacramento Metropolitan AQMD	18.6	37.2	25.2	50.5	45.1	90.3	61.2	122.4	65						Y		Y
San Diego APCD	31.4	62.8	42.2	84.4	75.7	151.4	101.6	203.3	250								
San Joaquin Valley APCD	52.5	104.9	71.5	143.1	127.4	254.8	173.8	347.5	-								
San Luis Obispo County APCD	3.6	7.2	4.9	9.7	8.7	17.3	11.8	23.6	10						Y	Y	Y
Santa Barbara County APCD	2.8	5.5	3.7	7.5	6.7	13.3	9.0	18.0	25								
Shasta County AQMD	2.3	4.5	3.1	6.2	5.5	11.0	7.5	14.9	25								
Siskiyou County APCD	0.5	1.1	0.7	1.5	1.3	2.6	1.8	3.6	-								
South Coast AQMD	142.4	284.7	192.4	384.8	344.0	688.0	465.0	930.0	55	Y	Y	Y	Y	Y	Y	Y	Y
Tehama County APCD	0.9	1.9	1.3	2.6	2.3	4.6	3.1	6.2	-								
Tuolumne County APCD	1.0	1.9	1.3	2.6	2.3	4.6	3.1	6.3	1,000								
Ventura County APCD	7.7	15.4	10.4	20.9	18.5	37.0	25.1	50.2	-								
Yolo Solano AQMD	8.2	16.3	11.1	22.2	19.8	39.5	26.9	53.7	-								

Y - Indicates a standard is exceeded

Table 4.2.4.15: Comparison of Daily District Emissions to the Most Restrictive District Threshold																	
	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
Air District	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
Amador County APCD	0.6	1.2	0.8	1.7	1.5	3.0	2.0	4.1	-								
Bay Area AQMD	53.8	107.6	72.5	145.0	129.5	259.0	174.6	349.1	80		Y		Y	Y	Y	Y	Y
Butte County AQMD	2.8	5.5	3.8	7.5	6.7	13.5	9.2	18.3	25								
Calaveras	1.2	2.4	1.7	3.3	3.0	5.9	4.1	8.1	-								
Colusa	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	-								
El Dorado County APCD	3.3	6.6	4.5	9.0	8.0	16.0	10.9	21.8	82								
Feather River AQMD	4.0	8.1	5.5	11.1	9.8	19.7	13.4	26.9	25								Y
Glenn	0.3	0.5	0.4	0.7	0.7	1.3	0.9	1.8	25								
Great Basin	0.7	1.4	0.9	1.9	1.7	3.4	2.3	4.5	150								
Imperial County APCD	2.9	5.9	4.0	8.0	7.1	14.2	9.7	19.4	55								
Kern County APCD	11.4	22.9	15.6	31.2	27.8	55.6	38.0	75.9	137								
Lake County AQMD	0.8	1.7	1.1	2.3	2.0	4.1	2.8	5.6	150								
Lassen	0.3	0.6	0.4	0.8	0.7	1.5	1.0	2.0	150								
Mariposa County APCD	0.3	0.5	0.4	0.7	0.6	1.3	0.9	1.7	-								
Mendocino County AQMD	0.8	1.5	1.0	2.1	1.8	3.7	2.5	5.0	-								
Modoc County APCD	0.1	0.2	0.1	0.3	0.2	0.5	0.3	0.6	250								
Mojave Desert South Coast AQMD	73.4	146.9	100.2	200.4	178.3	356.7	243.3	486.7	10	Y	Y	Y	Y	Y	Y	Y	Y
Monterey Bay Unified APCD	5.7	11.3	7.7	15.3	13.6	27.3	18.5	36.9	82								
North Coast Unified AQMD	1.3	2.5	1.7	3.4	3.1	6.1	4.2	8.3	-								
Northern Sierra AQMD	2.5	5.1	3.5	6.9	6.1	12.2	8.4	16.8	137								
Placer County APCD	8.1	16.1	11.0	22.0	19.6	39.1	26.7	53.5	82								

Table 4.2.4.15: Comparison of Daily District Emissions to the Most Restrictive District Threshold

Air District	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
Sacramento Metropolitan AQMD	18.6	37.2	25.2	50.5	45.1	90.3	61.2	122.4	65						Y		Y
San Diego APCD	31.4	62.8	42.2	84.4	75.7	151.4	101.6	203.3	250								
San Joaquin Valley APCD	52.5	104.9	71.5	143.1	127.4	254.8	173.8	347.5	-								
San Luis Obispo County APCD	3.6	7.2	4.9	9.7	8.7	17.3	11.8	23.6	10						Y	Y	Y
Santa Barbara County APCD	2.8	5.5	3.7	7.5	6.7	13.3	9.0	18.0	25								
Shasta County AQMD	2.3	4.5	3.1	6.2	5.5	11.0	7.5	14.9	25								
Siskiyou County APCD	0.5	1.1	0.7	1.5	1.3	2.6	1.8	3.6	-								
South Coast AQMD	142.4	284.7	192.4	384.8	344.0	688.0	465.0	930.0	55	Y	Y	Y	Y	Y	Y	Y	Y
Tehama County APCD	0.9	1.9	1.3	2.6	2.3	4.6	3.1	6.2	-								
Tuolumne County APCD	1.0	1.9	1.3	2.6	2.3	4.6	3.1	6.3	1,000								
Ventura County APCD	7.7	15.4	10.4	20.9	18.5	37.0	25.1	50.2	-								
Yolo Solano AQMD	8.2	16.3	11.1	22.2	19.8	39.5	26.9	53.7	-								

Y - Indicates a standard is exceeded

TABLE 4.2.4.16: ASSORTED SAMPLE CALCULATIONS USED TO DETERMINE ROG EMISSIONS FROM LOS ANGELES COUNTY. THESE CALCULATIONS CORRESPOND WITH TABLES 4.2.4.4. TO 4.2.4.14
LOS ANGELES SAMPLE CALCULATIONS
Average # of Multifamily New Home Permits (1967-2005) = 18,476
Average # of Multifamily New Home Permits (2002-2005) = 13,338
Standard Deviation of Multifamily New Home Permits (1967-2005) = 12,853
Average # of Single family New Home Permits (1967-2005) = 10,483
Average # of Single family New Home Permits (2002-2005) = 11,293
Standard Deviation of Single family New Home Permits (1967-2005) = 4,429
Statewide Annual Average Single and Multi Home Permits (2002-2005) = 205,871
% of CA houses that are MF = 13,338/205,871 = 6.48%
% of CA houses that are SF = 11,293/205,871 = 5.49%
MF 39-year Avg + 2 σ = 18,476 + 2*12,853 = 44,182
SF 39-year Avg + 2 σ = 10,483 + 2*4,429 = 19,341
MF 3-year Avg + σ = 13,338+12,853 = 26,191
MF 3-year Avg + σ = 11,293 + 4,429 = 15,722
MF New House Design Value = Maximum (44,182, 26,191) = 44,182
SF New House Design Value = Maximum (19,341, 15,722) = 19,341
MF New CPVC Design = 44,182*19% = 8,394
MF New CPVC Max = 44,182*45% = 19,882
SF New CPVC Design = 19,341*19% = 3,675
SF New CPVC Max = 19,341*45% = 8,703
MF Re-Pipe CPVC Design = 100,000*6.48%*19% = 1,231
MF Re-pipe CPVC Max = 100,000*6.48%*45% = 2,916
SF Re-pipe CPVC Design = 100,000*5.49%*19% = 1,043
SF Re-pipe CPVC Max = 100,000*5,49%*45% = 2,470
MF Slab CPVC Design = 200,000*6.48%*19%*5% = 123
MF Slab CPVC Max = 200,000*6.48%*45%*10% = 583
SF Slab CPVC Design = 200,000*5.49%*19%*5% = 104

TABLE 4.2.4.16: ASSORTED SAMPLE CALCULATIONS USED TO DETERMINE ROG EMISSIONS FROM LOS ANGELES COUNTY. THESE CALCULATIONS CORRESPOND WITH TABLES 4.2.4.4. TO 4.2.4.14
LOS ANGELES SAMPLE CALCULATIONS
SF Slab CPVC Max = 200,000*5.49%*45%*10% = 494
Equivalent MF Design = 8,394+1,231+123 = 9,748
Equivalent MF Max = 19,882+2,916+583 = 23,381
Equivalent SF Design = 3,675+1,042+104 = 4,821
Equivalent SF Max = 8,703+2,469+494 = 11,666
Primer ROG Emissions MF Design = 9,748*0.11*550/453.5924/2000 = 0.65
Cement ROG Emissions MF Design = 9,748*0.42*490/453.5924/2000 = 2.21
Primer + Cement ROG Emissions MF Design = 0.65+2.21 = 2.86
Primer + Cement ROG Emissions MF Design with Safety Factor = 2.86*2 = 5.72
Cement ROG Emissions MF Design with Safety Factor = 2.21*2 = 4.42
Primer + Cement ROG Emissions MF Design = 2.21 tons/year * 2000 pounds/ton * 196 days/year = 29.2 with safety factor = 29.2*2 = 58.4

Figure A-1: California Counties

Figure A-2: California Air Basins

Figure A-3: California Air Districts

Figure B-1 State Ozone Attainment Designations

Figure B-2 National 1-Hour Ozone Designations

Figure B-3: National 8-Hour Ozone Designations

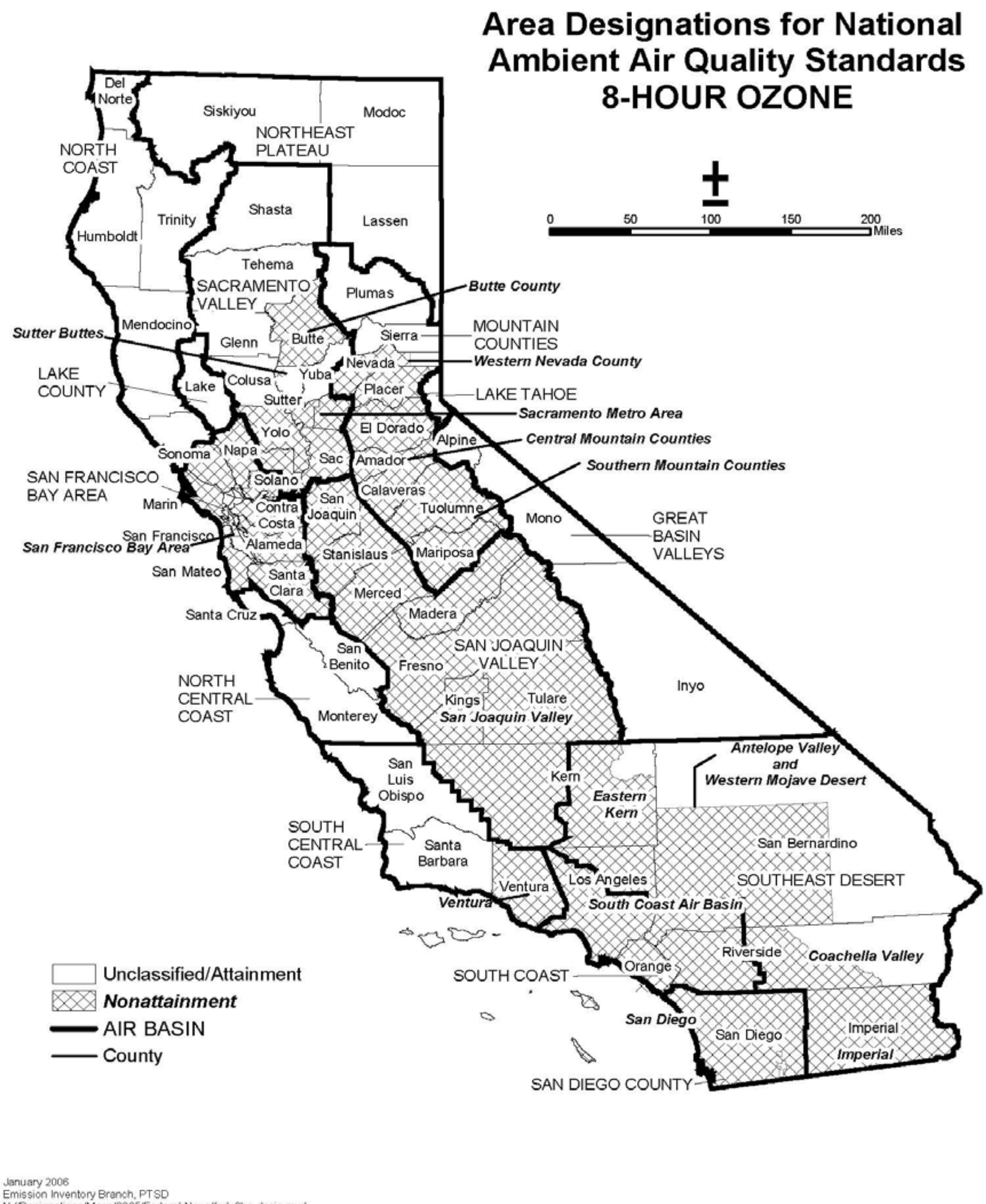


Figure 4.2.4.1: Single Family Housing Permits Issued in California Counties

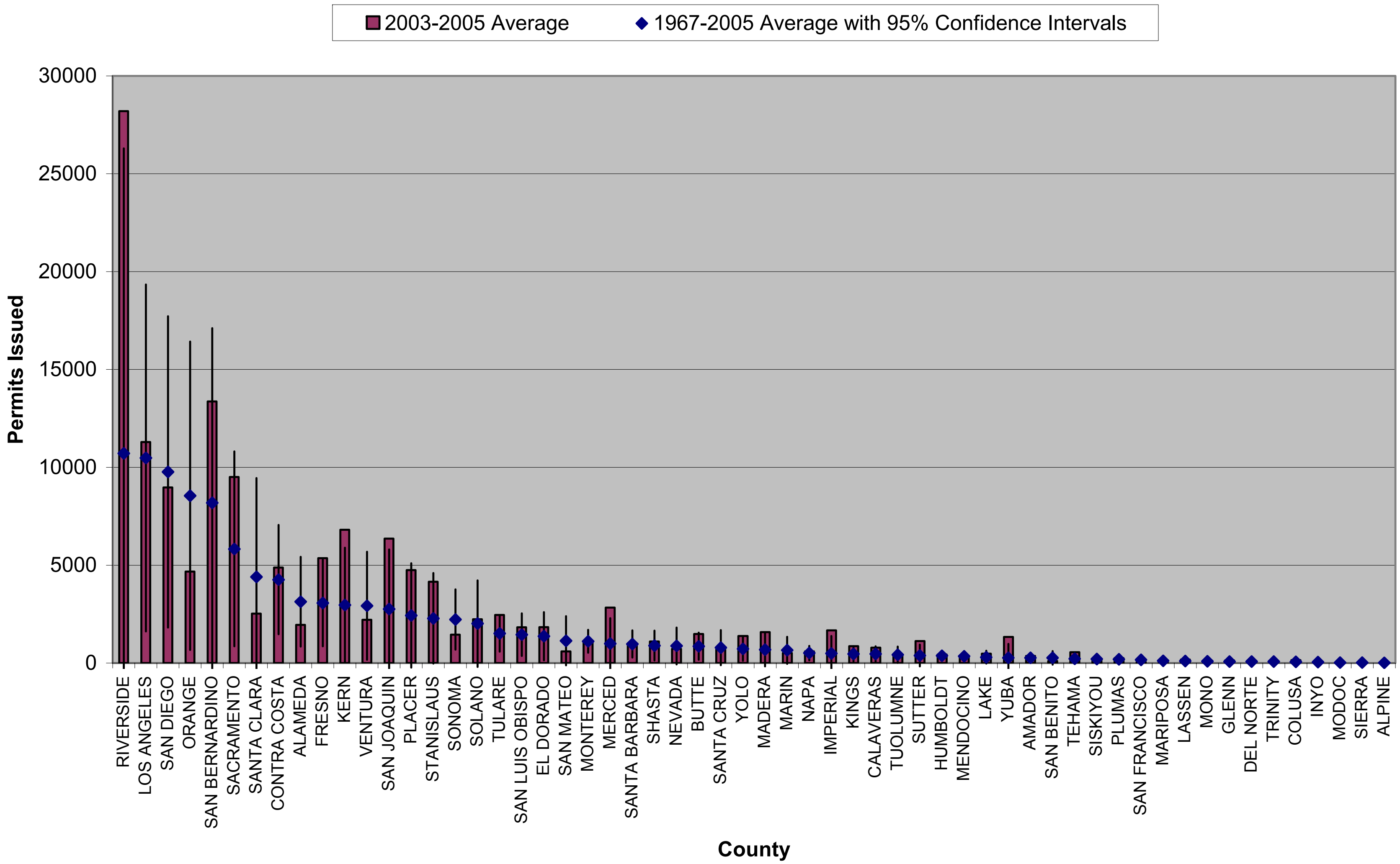


Figure 4.2.4.2: Multi Family Housing Permits Issued in California Counties

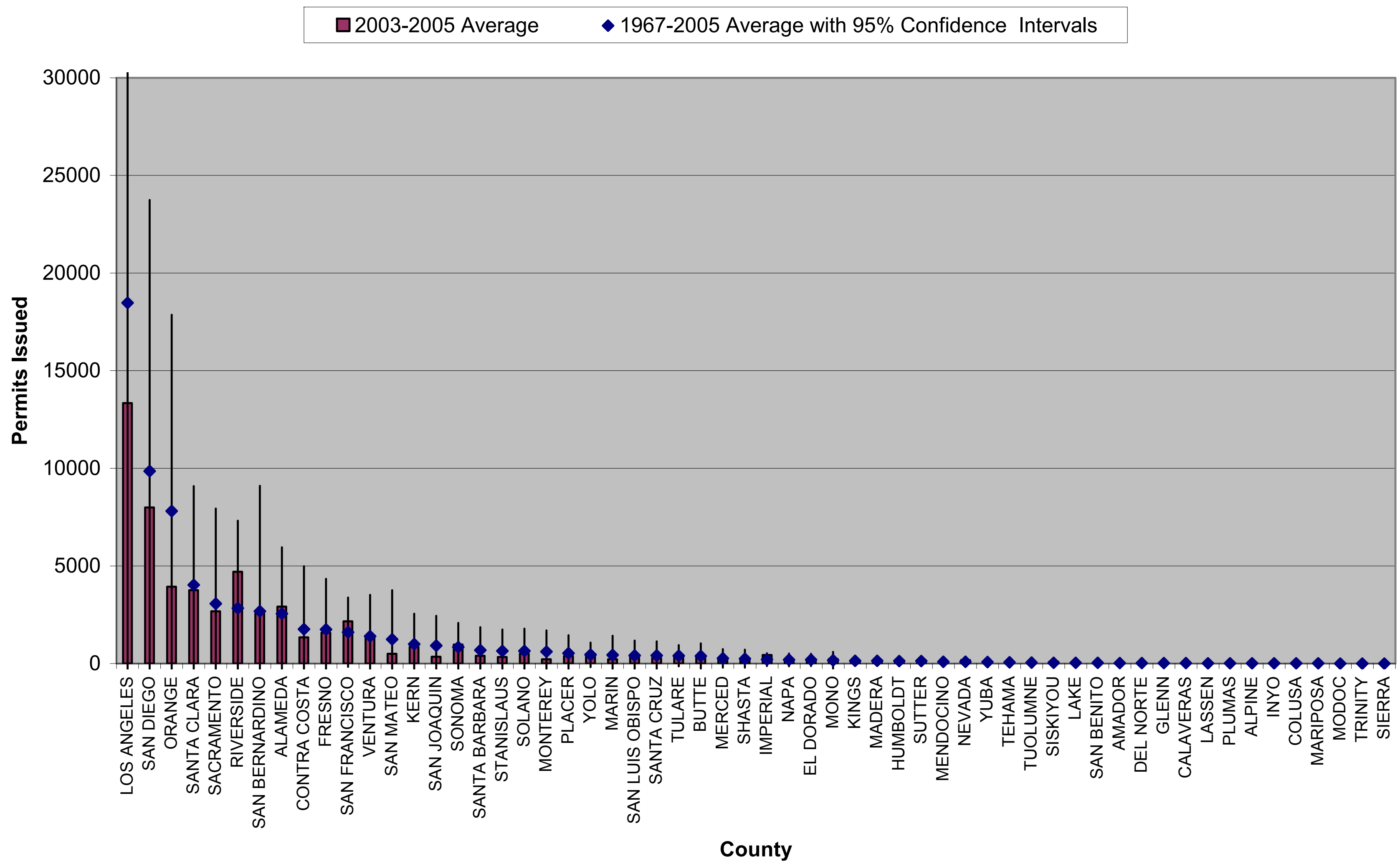


Figure 4.2.4.3: Total (Single + Multi) Family Housing Permits Issued in California Counties

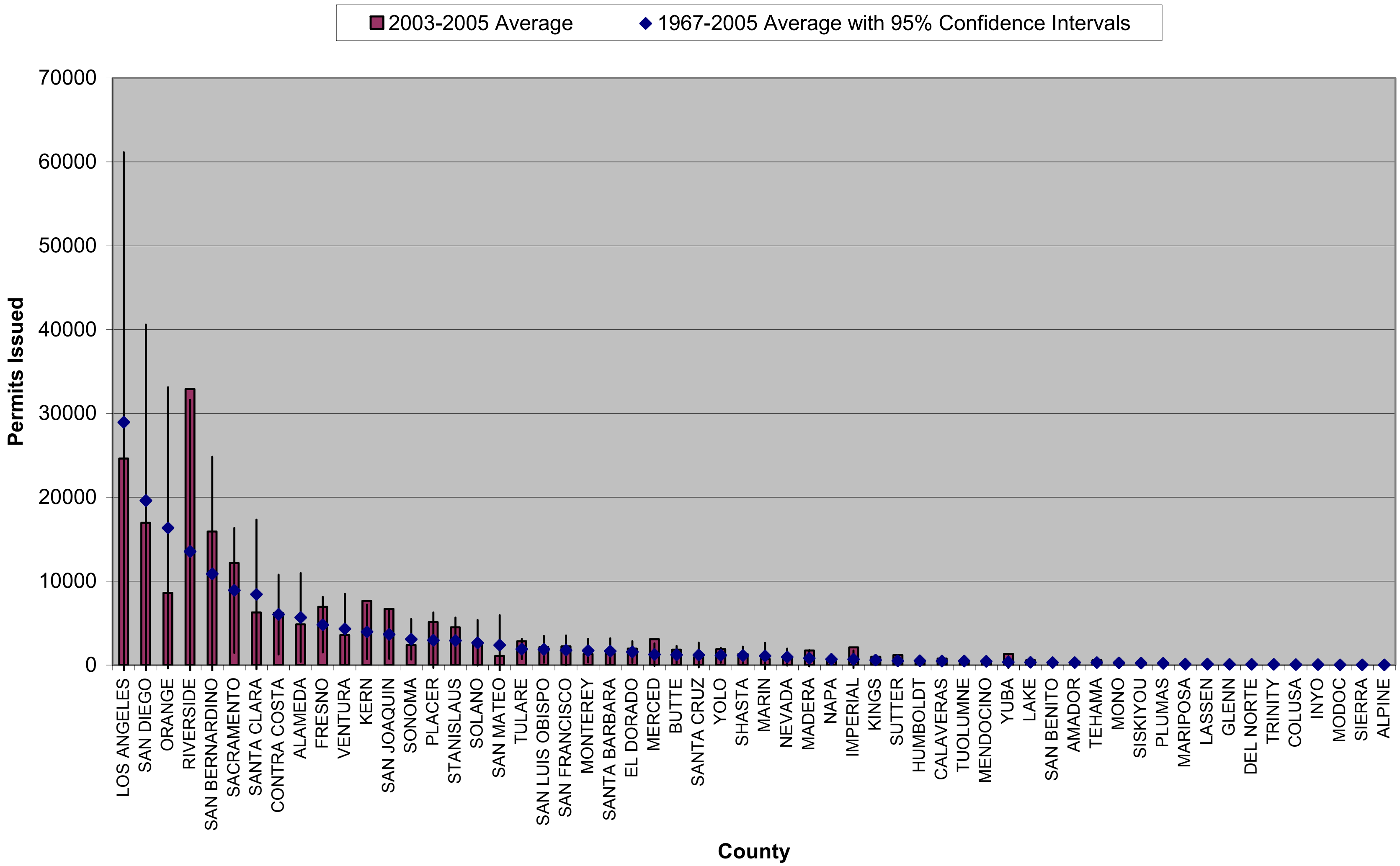
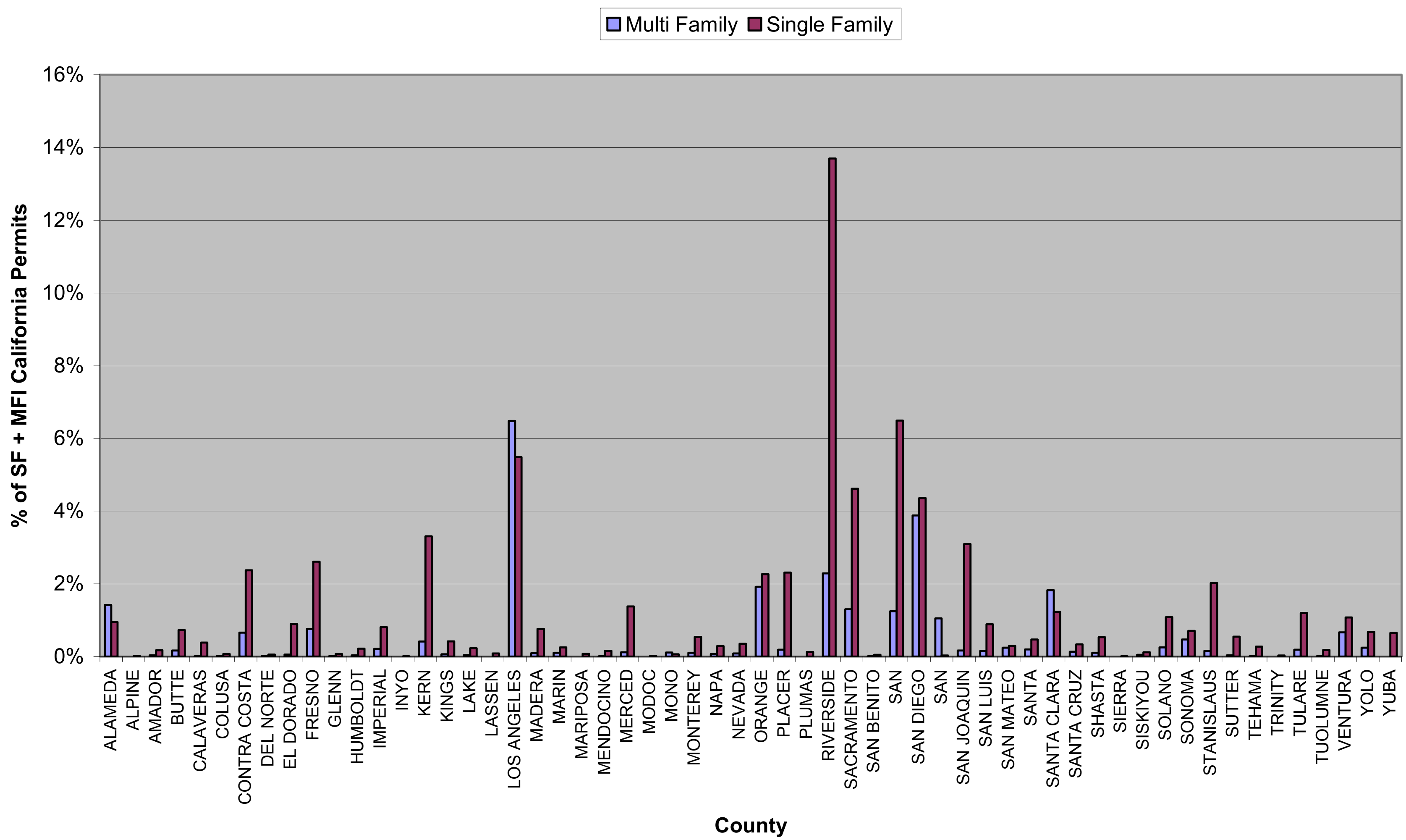


Figure 4.2.4.4: Ratio of Housing Permits Issued for Each County to Total Statewide Permitting. Based on 2002-2205 Data.



4.3 Water Quality

4.3.1 Environmental Setting

As mentioned previously, this EIR is limited to the impacts associated with the Project. The Project is the removal of the Findings Requirement, which served as a prerequisite to local approvals of CPVC installations, from the current California Plumbing Code. CPVC has already been approved for residential use in circumstances where a local building official makes the required findings, and the Project would allow use of CPVC for residential plumbing without such findings. Removal of the Findings Requirement would likely result in an increase in CPVC installations for potable water distribution in residential structures. However, the specific water quality impacts associated with each installation of CPVC plumbing would be identical to those that currently exist in areas where CPVC use has been allowed after the local building official has made the required findings.

The 2000 Mitigated Negative Declaration ("2000 MND") analyzed the impacts associated with conditional CPVC use (by virtue of the Findings Requirement). That analysis included potential impacts on water quality. In this EIR, the Lead Agency will only consider water quality impacts which are associated with increased use of CPVC across the state (not within a particular household), as well as any new information related to individual-unit use that was not available or could not have been known at the time the 2000 MND was approved.

The current market share of CPVC and other residential plumbing materials establish the context for the existing environmental setting related to water quality, i.e., the baseline against which potential water quality impacts of the proposed Project are to be compared. As explained in Section 3.5.2 of this Recirculated Draft EIR, the estimated current market share of CPVC pipe in California (subject to the Findings Requirement) is 13%, with copper pipe making up an estimated 53.5% of existing water pipe use and 33.5% attributed to all other materials. This section first discusses the current use of CPVC for residential plumbing systems at this percentage of market share, and then discusses the current use of copper.

4.3.1.1 Current CPVC Use

For over 20 years, the State has approved for residential structures the use of ABS plastic pipe for drain/waste/vent (D/W/V), PVC or CPVC for street water mains, and PVC for the service line from the street water main to the house. The current California Plumbing Code allows the use of CPVC products for residential potable water distribution if specific findings are made, and worker safety and flushing requirements are met. The Lead Agency is proposing to eliminate the requirement that, prior to approving the installation of CPVC as a potable water plumbing material, a local building official must find that there is or will be a premature failure of metallic pipe due to existing water or soil conditions (the “Findings Requirement”). The current worker safety and flushing requirements would remain as part of the California Plumbing Code and would continue to apply to all installation of CPVC for residential potable water use.

As discussed in the approved 2000 MND, CPVC pipe is manufactured from CPVC resins using heat and pressure. CPVC used for potable water pipe and fittings has certain stabilizers added to protect it from degradation during forming and use. The CPVC manufacturing formulas currently employed use tin-containing organic compounds (organotins) as stabilizers. CPVC also contains other additives, including pigments and lubricants to facilitate the forming of the pipe and fittings.

CPVC pipe and fittings are joined during installation using adhesives that contain certain solvent chemicals, including acetone (ACE), tetrahydrofuran (THF), methyl ethyl ketone (MEK), and cyclohexanone (CHX). These adhesives have been commonly used for years in the construction industry and have been permitted for use in California for PVC, non-residential use of CPVC and ABS D/W/v pipe, and are required to be installed pursuant to the instruction labels for the specific pipe. The 2000 MND took the installation requirements one step further for CPVC pipe within residential structures by incorporating specific worker safety measures into the regulation and also requiring that the pipe be flushed prior to first use by the resident.

4.3.1.2 Current Copper Use

Currently, copper is used for the majority of residential potable water plumbing in California. The copper pipe, fittings, joining compounds (solders and fluxes) and metal working fluids that comprise the majority of the existing environment of potable water piping in residential buildings in California are not entirely inert and insoluble; the materials they are composed of can and do contaminate the drinking water carried in the pipe. Copper is an essential nutrient, but also is toxic at higher doses.[24]

Previous studies have examined the extent to which copper pipe, fittings, solders, cutting fluids, and fluxes contaminate water carried in the pipe. Copper is toxic at low concentrations and is known to leach from pipe and contaminate water. In addition to the contamination of water by the materials from which copper pipe, fittings, and solders are manufactured, the drinking water sources of California have varying background levels of contaminants, including copper. There is a substantial body of data on the background levels of these contaminants in the sources of drinking water in California.

[24] Faust, Ph. D., Oak Ridge National Laboratory, *Toxicity Summary for Copper*, p. 13-14 (Oak Ridge Reservation Environmental Restoration Program, Dec. 1992).

The California Department of Health Services (DHS) is the State agency responsible for safeguarding California's drinking water. The DHS monitors and regulates the numerous public water purveyors in California. In response to legislative mandate, the DHS has established standards and action levels for copper in drinking water.[25] There is also a monitoring program to detect copper in drinking water.[26] If the established actions levels for copper are exceeded, actions must be taken to reduce the levels.[27]

Short History of Copper Corrosion: There are three main geographic concentrations of copper pipe failures in California: the east San Francisco Bay Area, portions of the Inland Empire, and the Santa Clarita Valley. In extreme situations, the corrosion within copper pipes has caused excessive leaching of copper into the water supply, turning the water blue in color and making it unsuitable for human consumption. Other areas experienced severe problems with copper pipe failures because of untreated well water and aggressive soil conditions.

Jurisdictions with Copper Pipe Failures: The following counties were identified during the preparation of the 1998 EIR as experiencing copper pipe failures: Alameda, Contra Costa, Fresno, Kern. Los Angeles, Orange, Riverside, Santa Barbara, San Benito, San Bernadino, Santa Clara, San Diego, San Joaquin, Sonoma, Tulare, and Ventura.

Concentrations of Severe Copper Pipe Failures: Within most jurisdictions, the majority of copper pipe failures appear to be scattered within communities, not concentrated in neighborhoods. In the majority of pipe failure occurrences, the copper pipe is located below the concrete slab of the house where it can be directly exposed to aggressive water and soil conditions. However, about 15 to 30 percent of copper pipe failures appear to be clustered within specific neighborhoods.

Several occurrences of copper pipe failure have been discovered throughout the state. A plumbing survey report was conducted in April 1997 by the Coalition for Consumer Choice, and the following are examples of the types of responses received:

For the areas of San Diego, Los Angeles, Riverside, and San Bernadino Counties, one plumber stated that the projected life span of a copper pipe in cold water pitting areas was one to four years for homes built between 1991 and 1994 and four to eight years overall.

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[25] California Code of Regulations, title 22, division, 4, chapter 17.5, article 3, section 64678.
[26] California Code of Regulations, title 22, division, 4, chapter 17.5, articles 3-4.
[27] California Code of Regulations, title 22, division, 4, chapter 17.5, article 6.

Re-piping was conducted in several communities in Southern California, including Del Mar, Poway, La Jolla, Escondido, Carlsbad, and Chula Vista. A majority of the failures in these areas occurred where the copper pipes were located under concrete slabs where there were hostile water and soil conditions. In these areas, the copper pipes endured up to three to five years, whereas the re-pipes lasted over 10 years.

Extensive re-piping work was also performed in the areas of Santa Clarita and Ventura. Santa Clarita has a problem with both aggressive water and soils, whereas Ventura has problem just with its soil. The pipes and replacements lasted only two years under these conditions.

There are several more examples of copper failures throughout California that illustrate the severity of the problem and the cost to repair the damage, both to homebuilders and homeowners. (See 1998 Final EIR for Chlorinated Polyvinyl Chloride (CPVC) Pipe Use for Potable Water Piping in Residential Buildings, Appendix D, 4). The Lead Agency considers this situation to be contrary to the goal of providing Californians with decent, affordable housing.

<u>Copper Contamination</u>: Copper, as a corrosion by-product, can be found at elevated levels at kitchen and bathroom taps in residences in virtually any part of the country.[28] Copper concentrations are highly dependent on the quality of the water carried in the pipe (how corrosive it is), how long the water stands in the pipe, and the age of the pipe. For many years it has been known that under conditions of extended dwell time and aggressive (corrosive) water, the concentrations of copper leaching from soldered copper potable water pipe in a residential building can exceed established standards. The probability of contamination of water by copper pipe occurring is greatest immediately after installation, if the system is not flushed, but these levels could be exceeded any time throughout the lifetime of the pipe, depending on dwell time and water conditions. Available information shows that even with relatively brief dwell times (one hour), water may exceed the U.S. EPA Maximum Contaminant Level for copper at pH levels that are in the range within which NSF tests and certifies copper pipes as safe for drinking water use (NSF 61).[29]

<u>Existing Standards and Public Health Goal for Copper</u>*:* Under the federal Safe Drinking Water Act of 1986, the U.S. EPA has adopted a maximum contaminant level ("MCL")

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[28] Marshall, W. 1994. *Copper in Drinking Water: What the Lead and Copper Rule Tells Us and What It Doesn't Tell Us*, Proceedings, 1994 Water Quality Technology Conference, Pt. II – Session 4A-ST7 (Nov. 6-10, 1994, S.F., CA. (Am. Water Works Ass'n 1994).

[29] Jacobs, S., Reiber, S., & Edwards, M., *Sulfide-induced copper corrosion*, Journal AWWA, Vol. 90, Issue 7 (Am. Water Works Ass'n, July 1998).

goal for copper in drinking water of 1.3 mg/L, which is based on preventing gastrointestinal distress from short term exposure, and liver and kidney damage from long term exposure. This has been criticized by various parties as being both too high and too low.[30] The U.S. EPA also has adopted a non-enforceable secondary MCL for copper in drinking water of 1.0 mg/L, which is based on preventing unpleasant taste. Although unenforceable at the federal level, states may adopt secondary MCLs established by the U.S. EPA as an enforceable regulation. The California Department of Health Services has established a Regulatory Action Level for copper of 1.3 mg/L and a Secondary MCL of 1 mg/L. The California EPA's Office of Environmental Health Hazard Assessment has established a Public Health Goal for copper of 170 parts per billion.

The acute toxic effects of copper include gastrointestinal disturbances with vomiting, epigastric burns, and diarrhea.[31] Chronic copper poisoning has not been described in normal human beings.[32] However, systemic effects, especially hemolysis, liver and kidney damage, have been reported after ingestion of large amounts of copper salts.[33] Infants and children may be more sensitive to copper toxicity[34] due to the fact that the liver enzyme system which manages copper levels in the body are not fully developed.[35] The effects of copper toxicity in humans resemble the symptoms generally described as "colic." Diarrhea in small children has been attributed to the drinking of tap water containing around 1 mg/L of copper[36] (which is close to the Secondary MCL), although there are limited data[37] and there is not a consensus of expert opinion.[38] Copper toxicity in humans tends to be self-limiting, that is, the effects (vomiting) tend to limit additional consumption.

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[30] Pontius, F.W., *Defining a Safe Level for Copper in Drinking Water*, Journal AWWA, Vol. 90, Issue 7 (Am. Water Works Ass'n, July 1998).

[31] Aaseth, J. & Norseth, T., *Copper*, Handbook of the Toxicology of Metals, Vol. II: Specific Metals, p. 233-254 (Elsevier Science Publishers B.V., 2d Ed.1986).

[32] *Ibid.*

[33] *Ibid.*

[34] Pontius, F.W., *Defining a Safe Level for Copper in Drinking Water*, Journal AWWA, Vol. 90, Issue 7 (Am. Water Works Ass'n, July 1998).

[35] Sternlieb, I., *Copper and the Liver*, Gastroenterology, Vol. 78, No. 6 (Am. Gastroenterological Association, 1980).

[36] Aaseth, J. & Norseth, T., *Copper*, Handbook of the Toxicology of Metals, Vol. II: Specific Metals, p. 244 (Elsevier Science Publishers B.V., 2d Ed.1986).

[37] Pontius, F.W., *Defining a Safe Level for Copper in Drinking Water*, Journal AWWA, Vol. 90, Issue 7 (Am. Water Works Ass'n, July 1998).

[38] Aaseth, J. & Norseth, T., *Copper*, Handbook of the Toxicology of Metals, Vol. II: Specific Metals, pp. 233-254 (Elsevier Science Publishers B.V., 2d Ed.1986).

Mitigation Measures Now in Place to Reduce the Levels of Copper in Drinking Water: In California at this time, there are three basic approaches to reducing the public health impacts of copper in drinking water: 1) actions to reduce concentrations in source waters, 2) actions to reduce leaching from pipe, including restrictions of the use of copper and replacement of metal pipe with pipe made from other materials, such as CPVC, and 3) actions aimed at reducing exposure by consumers. In addition to monitoring and reporting requirements to detect elevated copper levels in water, there are more stringent monitoring and reporting requirements which must be followed by water systems found to have excessive levels of copper.

If a water system is found to have copper levels exceeding the action levels set by the California Department of Health Services, the system operator is required to institute a source monitoring program. The Department of Health Services can require source water treatment to remove copper and set maximum permissible copper concentrations for treated water entering the distribution system.[39]

Corrosion Control: In compliance with the U.S. EPA Lead and Copper Rule, based on the results of monitoring for copper in tap water, and the results of water quality parameter monitoring, the Department of Health Services may require water systems to implement corrosion control treatments designed to reduce copper concentrations in tap water.[40] Corrosion control treatments often involve adding chemicals, such as caustic soda, to the water. Only materials tested and certified by NSF may be employed for this purpose. As with other NSF certifications discussed in this EIR, the Lead Agency believes this certification to be, in general, a reasonable assurance that the addition of more corrosion-control chemicals to drinking water would not result in significant adverse effects on consumers.

Other measures which could help reduce corrosion could include increasing local enforcement of existing requirements for proper grounding and use of water soluble fluxes followed with flushing prior to occupancy. Additional measures could include requiring all buried copper pipe to be protected from soil contact by installation in plastic pipe; requiring pipe wraps or coatings, as is now required for buried steel pipe conveying natural gas in residential construction; or requiring internal coating of copper pipe, as is now required in some applications where copper contamination is not acceptable. However, the ongoing corrosion of metal pipe in the face of the existing installation standards, code requirements, and corrosion-control technologies demonstrates that they are not entirely sufficient. This is reinforced by the limitations on

[39] California Code of Regulations, title 22, division, 4, chapter 17.5, article 6, sections 64685-64686.
[40] California Code of Regulations, title 22, division, 4, chapter 17.5, article 5.

NSF certification of copper for safety (NSF 61) and the NSF-required manufacturer's use instructions. Compliance with these limitations would, in the opinion of the Lead Agency, avoid a potential for adverse impacts on drinking water quality from copper pipe, under typical conditions of use.

Consumers can significantly lower copper intake by allowing taps to run for a minute or two prior to using the water.[41] However, this can result in a significant amount of wasted water. Based on 2000 census results indicating that there are 11,502,870 households in California, assuming that copper pipe maintains a 53.5 percent share of the market for residential potable water systems, assuming a flow rate of 2.2 gallons per minute maximum[42], and assuming that each household plumbed with copper allowed its taps to run for one minute each day, approximately 13.5 million gallons of water per day potentially could be wasted if consumers follow this recommendation.

<u>Leaching of Lead from Copper Pipe Solder and Fluxes</u>: Lead is a toxic metal known to be harmful to human health if inhaled or ingested.[43] Too much lead in the human body can seriously damage the brain, kidneys, nervous system, and red blood cells.[44] Historically, solder used to join copper pipe normally contained about 50 percent lead.[45] In 1986, however, the Safe Drinking Water Act was amended to require the use of "lead-free" pipe, solder, and flux in the installation or repair of any public water system, or any plumbing in a residential or non-residential facility connected to a public water system.[46] Under the amended provisions of the Act, solders and flux are considered "lead-free" if they contain no more than 0.2 percent lead.[47] Pipes and fittings are considered "lead-free" when they contain no more than 8.0 percent lead.[48]

California law also now prohibits the use of solder and flux containing more than 0.2 percent lead for making joints and fittings in any public or private water supply system or

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[41] Pontius, F.W., *Defining a Safe Level for Copper in Drinking Water*, Journal AWWA, Vol. 90, Issue 7 (Am. Water Works Ass'n, July 1998).

[42] All faucets are designed to provide a maximum flow rate of 2.2 gallons per minute to meet water conservation guidelines. *See, e.g.,* Moen, Specifications, Single Control Kitchen Faucet Models: 87316C, 87316SL, 87316V, 87316W, *available at* http://www.moen.com/shared/pdf/87316Csp.pdf (last accessed Nov. 8, 2006).

[43] U.S. EPA, *Lead in Drinking Water: Actions You Can Take to Reduce Lead in Drinking Water* (June 1993); *available at* http://www.epa.gov/safewater/lead/lead1.html (last updated Aug. 24, 2006).

[44] *Ibid.*

[45] *Ibid.*

[46] 42 U.S.C. section 300g-6(a)(1)(A).

[47] 42 U.S.C. section 300g-6(d)(1).

[48] 42 U.S.C. section 300g-6(d)(2).

any water user's pipelines.[49] Solder or flux with a lead content greater than 0.2 percent sold in California must bear a warning label stating that it is illegal to use the solder or flux in the installation or repair of any plumbing providing water for human consumption.[50]

California also recently passed Assembly Bill No. 1953 (AB 1953), which amended Health and Safety Code section 116875, in order to revise the term "lead free," for purposes of manufacturing, industrial processing, and conveying or dispensing water for human consumption, to refer not to the lead content of pipes and pipe fittings, plumbing fittings, and fixtures but instead to a weighted average lead content of the wetted surface area of the pipes, fittings, and fixtures of not more than 0.25%. This standard is stricter than the current standard for "lead free" pipes and fittings under Health and Safety Code section 116875, which is identical to the federal standard requiring that such pipes and fittings contain no more than 8.0 percent lead. These amendments become effective on January 1, 2010.

Although these federal and state restrictions on the content of lead materials in drinking water systems have been in place since the late 1980s, these restrictions do not eliminate lead contamination within existing plumbing systems that were installed earlier.[51] Additionally, high lead content solders continue to be manufactured and sold, but are labeled as unsuitable for use with potable water piping. The U.S. EPA has indicated that in enforcing the "lead-free" restrictions, some states have continued to find illegally used lead solder in new plumbing installations.[52] This suggests that some plumbing installations or repairs using lead solder may be escaping detection due to the limited number of personnel enforcing these regulations.[53]

<u>Non-Metallic Leachates from Copper Pipe</u>: Despite the widespread and long-standing use of copper pipe and the constant contact of drinking water with this piping material, there is little information available on the chemical composition of and contamination of water by the fluxes and cutting fluids used to join and work copper pipe and fittings used for potable water piping in residential buildings. The following discussion is therefore general and fairly limited. As with any material which comes in contact with potable

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[49] California Health and Safety Code section 116875.

[50] In addition, federal law restricts the lead content of alloys used for faucets, pipes and other plumbing materials to no more than 8.0 percent lead.

[51] U.S. EPA, *Lead in Drinking Water: Actions You Can Take to Reduce Lead in Drinking Water* (June 1993).

[52] *Ibid.*

[53] *Ibid.*

water, there is a potential that these materials will contaminate the water to some degree. As always, the issue is whether the levels are significant.

Copper pipe and fittings are generally joined by soldering, which consists of using a relatively low-melting point alloy to form a bond between parts. Fluxes are materials used to chemically clean the metal surfaces, protect the hot metal from oxidation, and facilitate the wetting of metal pipe by the molten solder used to make joints. In the recent past, fluxes were not readily soluble in cold water, and were mainly composed of tree resin, tallow, ammonium chloride, and zinc chloride. These fluxes did not readily flush out and could cause corrosion failure of the pipe. At one time, some fluxes contained significant amounts of lead. Flux composition and characteristics have been changed in an effort to reduce copper pipe corrosion and contamination of drinking water. Recently developed and introduced fluxes are readily soluble in cold water in order to facilitate flushing.

During the soldering operation, heat is applied and the flux melts and flows (if a solid or paste flux is used), then the solder is introduced to the joints. The molten solder flows into the joint under capillary action, displacing the hot flux. The water-soluble fluxes which have recently been developed should alleviate corrosion related to flux use. The introduction of water-soluble fluxes was a factor considered by the Lead Agency in requiring that all newly installed or repaired potable water pipe systems be flushed prior to being put in service. The materials in water-soluble fluxes, and the pipe, fitting, and solder components dissolved by the corrosive materials in flux, will likely be present in very high concentrations in the first water drawn from a newly installed or repaired system.

<u>Measures to Reduce Contamination of Potable Water from Piping Materials</u>: The issue of drinking water contamination by pipe, fittings and materials used to join pipe and fittings is not unique to CPVC pipe. This issue has been raised before in relation to metallic pipe, and has been addressed by the Legislature and those public agencies and independent organizations which regulate public drinking water systems, drinking water quality, the public health, and test and certify plumbing materials.

Restrictions on the Materials Used: Lead is a toxic, heavy metal which is known to accumulate in the body. Children are particularly sensitive to lead poisoning. Solders containing small amounts of lead are used to join copper piping. Lead is also present such as faucets. Lead can and does dissolve from fixtures and solders and contaminate drinking water to some degree. As discussed above, DHS, in response to legislative mandate, amended the CBC to reduce the quantities of lead allowed in solders, fluxes, and fixtures used for potable water piping.

The NSF Certification of copper pipe as safe for potable water use has a restriction statement, providing that copper tube is certified to ANSI/NSF Standard 61 for public water supplies meeting, or in the process of meeting the U.S. EPA Lead and Copper Rule, and that water supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water.[54] The manufacturer's use instructions for NSF 61 certified copper pipe are required to include this limitation.

Flushing: One important element of the installation or repair of any potable water system is to assure that dirt, debris and materials used in the process of fabrication, installation or repair do not contaminate the water in significant concentrations at the time consumers begin to use the system. There are existing measures employed in California and elsewhere in the United States which address this. These measures are disinfection and flushing.[55]

Flushing requirements for all newly installed or repaired pipe already have been adopted into the California Plumbing Code. One of the specific contaminants that this is intended to reduce is solder dross, the hazardous waste generated when soldering copper pipe. Water standing in newly installed soldered copper pipe can have very high levels of copper, lead, tin and other materials, even if low-lead-content solders are used.

<u>Environmental Contamination from Copper Pipe</u>: In addition to contaminating drinking water, copper leached from potable water piping has the potential to contaminate the natural environment of the State. Copper is a metal that can have adverse impacts, especially in aquatic ecosystems, at very low concentrations. Copper is acutely toxic to plankton.[56] Copper also accumulates in clam tissue, affecting reproduction, development, and growth, and affects other aquatic species.[57]

Copper toxicity in aquatic ecosystems has been recognized as a chronic environmental problem in California for several years. In particular, the waters of the San Francisco

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[54] NSF Restriction Statement: Copper tube (Alloy C12200).

[55] Disinfection has not been addressed in this EIR since it is unrelated to the nature of the material used for piping. Disinfection is necessary to kill disease-causing organisms that may be present on the inside surfaces of newly installed or repaired potable water pipe and fixtures. Disinfection is required under the existing building codes in California. In summary, this requires flushing with potable water, filling the pipes with a chlorine solution, and allowing this disinfectant solution to stand in the pipes for a prescribed time, followed by flushing again with potable water to purge the system of the disinfectant.

[56] *Preventing Corrosion Protects San Francisco Bay, A Fact Sheet for Designers*, Bay Area Clean Water Agencies/Bay Area Pollution Prevention Group (2003).

[57] *Ibid.*

Bay south of the Dumbarton Bridge (the "Lower South SF Bay") have been very well studied and have a long history of copper inputs from the regulated point source discharges of publicly owned wastewater treatment plants. Of the copper contributed to the Lower South SF Bay by wastewater, a large percentage is believed to be from copper pipe corrosion.[58]

Surface water quality and the regulation of discharges of pollutants to surface waters are under the jurisdiction of the State Water Resources Control Board (SWRCB) and the several Regional Water Quality Control Boards (RWQCBs). The RWQCBs administer state and federal water pollution control statutes[59] largely through permits for authorized discharges and enforcement actions. The RWQCBs adopt waste discharge requirements for point source waste discharges to waters of the State. The limitations in the waste discharge requirements are intended to protect beneficial uses of water, including water use by humans, wildlife, and aquatic organisms.

The copper impairment of the waters of the Lower South SF Bay is described and discussed below as an example. The Lower South SF Bay is not the only water body which is known to be impaired by copper from municipal point source discharges with waste discharge permits. Pursuant to Section 303(d) of the Clean Water Act, the SWRCB is required to develop a list of water quality limited segments of waters in California and requires that priority rankings be established for the development of action plans, called Total Maximum Daily Loads (TMDLs), to improve the water quality of such waters. The SWRCB's 2002 Section 303(d) list identifies those water bodies which are impaired due to pollution by various pollutants. The SWRCB is in the process of revising the Section 303(d) list, and has proposed a draft final list of water bodies which are currently impaired for inclusion in a 2006 Revision of the Clean Water Act Section 303(d) list. For a number of these impaired water bodies, municipal point source discharges of copper are listed as a source of the pollution. Given that corrosion of copper potable water pipe has been identified as a significant source of copper in the municipal point source discharges to the South Bay, it is reasonable to assume that copper pipe corrosion is at least a contributing factor to the copper content of municipal

[58] One source indicates that 60% of the copper introduced into the Lower South SF Bay from wastewater is due to corrosion. *Preventing Corrosion Protects San Francisco Bay, A Fact Sheet for Designers*, Bay Area Clean Water Agencies/Bay Area Pollution Prevention Group (2003). Another source indicates that the source of 60% of the copper in Palo Alto's wastewater is corrosion, 58% of copper in San Jose's wastewater comes from corrosion, and 30% of copper in Sunnyvale's wastewater comes from corrosion. 2006 City of Palo Alto Regional Water Quality Control Plant *Copper Action Plan Report*, p. E-4.

[59] For example, the federal Clean Water Act (33 U.S.C. sections 1251-1387) and the Porter-Cologne Water Quality Control Act (California Water Code sections 13000 *et seq.*).

point source discharges to these other water bodies. Among the water bodies currently listed in the 2002 Section 303(d) list[60] as polluted by copper are:

- Los Angeles Harbor Main Channel
- Los Angeles River Reach 1 (Estuary to Carson Street)
- Oakland Inner Harbor (Pacific Dry-dock Yard 1 Site, part of SF Bay, Central)
- Rio Hondo Reach 1 (Confl. LA River to Snt Ana Fwy)
- San Pedro Bay nearshore and offshore zones
- San Diego Bay Shoreline, between Sampson and 28th Streets
- San Diego Bay, Shelter Island Yacht Basin

The following are among the changes related to water bodies for which copper is listed as a pollutant in the currently proposed draft version of the 2006 Revisions of the Clean Water Act Section 303(d) List of Water Quality Limited Segments[61]:

- Listing copper as a pollutant to Aliso Canyon Wash
- Listing copper as a pollutant to Burbank Western Channel
- Listing copper as a pollutant to Calleguas Creek Reaches 1 and 2
- Listing copper as a pollutant to Dominguez Channel (lined portion above Vermont Ave)
- Listing copper as a pollutant to Los Angeles Harbor – Consolidated Ship
- Listing copper as a pollutant to Los Angeles Harbor – Fish Harbor
- Listing copper as a pollutant to Los Angeles Harbor – Inner Cabrillo Beach Area
- No longer listing copper as a pollutant to Los Angeles River Reach 1
- No longer listing copper as a pollutant to Rio Hondo Reach 1
- Listing copper as a pollutant to San Diego Bay Shoreline at Americas Cup Harbor, Coronado Cays, Glorietta Bay, Harbor Island (East and West Basins), Marriott Marina, and Chula Vista Marina

[60] State Water Resources Control Board, 2006 Revision of Clean Water Section 303(d) List of Water Quality Limited Segments, Volume I, Appendix 1: 2002 section 303(d) list.

[61] State Water Resources Control Board, Proposed 2006 CWA Section 303(d) List of Water Quality Limited Segments (Sept. 15, 2006).

- No longer listing copper as a pollutant to San Diego Bay, Shelter Island Yacht Basin

In the Lower South SF Bay, there have been several studies and several measures taken to address the copper problem. "Lower South SF Bay has been listed as impaired due to point source discharges of generic metals since 1990 (USEPA Clean Water Act §304(l) listing) and most recently for copper and nickel from point and urban runoff sources in the State of California's 1998 Clean Water Act §303(d) list. The primary reason for the copper and nickel impairment listings had been that ambient water concentrations of dissolved copper and nickel exceeded Basin Plan water quality objectives or US EPA national water quality criteria for the protection of aquatic life. Despite significant reductions in wastewater loadings over the past two decades, ambient concentrations at stations monitored through the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP) or the City of San Jose monitoring program still approach or exceed the previously-applicable criteria or water quality objectives in Lower South SF Bay."[62] As mentioned above, the largest single source of copper pollution from the wastewater treatment plants of the Cities of Palo Alto and San Jose is corrosion of copper drinking water piping, and this is also a significant source of copper pollution from Sunnyvale wastewater.[63]

The San Francisco RWQCB has adopted site-specific water quality objectives and a Water Quality Attainment Strategy for copper and nickel in the Lower South SF Bay. The Water Quality Attainment Strategy consists of the following four elements:

- Current control measures/actions to minimize copper and nickel releases (from municipal wastewater treatment plants and urban runoff programs) to Lower South SF Bay;
- Statistically based water quality "triggers" and a receiving water monitoring program that would initiate additional control measures/actions if the "triggers" are met;
- A proactive framework for addressing increases to future copper and nickel concentrations in Lower South SF Bay, if they occur; and
- Metal translators that will be used to compute copper and nickel effluent limits for the municipal wastewater treatment plants discharging to Lower South SF Bay.

Except for the specification of metal translators, all of the actions and monitoring programs set forth in the Water Quality Attainment Strategy have been required by the

[62] San Francisco Bay Regional Water Quality Control Board, San Francisco Bay Basin Plan, Ch.4: Implementation Plan.

[63] 2006 City of Palo Alto Regional Water Quality Control Plant *Copper Action Plan Report*, p. E-4.

National Pollutant Discharge Elimination System (NPDES) permits for the three municipal wastewater dischargers and the municipal urban runoff (stormwater) dischargers in Lower South SF Bay since October 2000 and March 2001, respectively.[64] The San Francisco RWQCB has indicated that is likely that these objectives are currently being obtained.[65] Nevertheless, the Lead Agency finds that continued exclusive use of copper pipe materials for new homes and repiping could contribute to the continued discharge of copper to the Lower South SF Bay and other water bodies. In some areas, this could contribute to a failure to meet water quality goals and waste discharge requirements relative to copper.

One of the feasible control strategies identified by the Bay Area Clean Water Agencies and Bay Area Pollution Prevention Group for the ongoing problem of copper pollution in San Francisco Bay is to consider non-copper pipe in potable water systems where its use is permitted.[66] For this reason, the City of Palo Alto is tracking the availability of alternatives to copper piping, including CPVC.[67]

One of the purposes of this EIR is to provide a basis for permitting the use of CPVC pipe where local conditions make it an attractive alternative, but where local building officials have not made or cannot make the findings under the Findings Requirement. The Lower South SF Bay example supports this effort.

<u>Conclusions Regarding Corrosion and Leaching from Copper Pipe</u>:

Drinking Water Contamination: While copper pipe is generally safe and effective for use for potable water conveyance, there are limitations and exceptions to this general conclusion. As discussed above, this is recognized explicitly in the NSF certification for copper as safe for potable water use (NSF 61).[68] In addition, as noted above, even with relatively brief dwell times (one hour) the MCL for copper can be exceed at pH levels in the range within which NSF tests and certifies copper pipe as safe for drinking water use (NSF 61).[69] Research has also found that sulfur-containing compounds could significantly accelerate copper corrosion and copper pipe-based contamination of

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[64] San Francisco Bay Regional Water Quality Control Board, San Francisco Bay Basin Plan, Ch.4: Implementation Plan.

[65] San Francisco Bay Regional Water Quality Control Board, San Francisco Bay Basin Plan, Ch.4: Implementation Plan.

[66] *Preventing Corrosion Protects San Francisco Bay, A Fact Sheet for Designers*, Bay Area Clean Water Agencies/Bay Area Pollution Prevention Group (2003).

[67] 2006 City of Palo Alto Regional Water Quality Control Plant *Copper Action Plan Report*, p. E-1.

[68] NSF Restriction Statement: Copper tube (Alloy C12200).

[69] Jacobs, S., Reiber, S., & Edwards, M., *Sulfide-induced copper corrosion*, Journal AWWA, Vol. 90, Issue 7 (Am. Water Works Ass'n, July 1998).

drinking water.[70] The NSF 61 test protocols use water which does not contain sulfer compounds, so there is a possibility that copper corrosion in the real world could be greater than that found in NSF certification testing.

Most Californians are served by public drinking water systems that are subject to the U.S. EPA Lead and Copper Rule, and which diligently and effectively control the chemistry of their water to minimize corrosion of copper. However, there are many private wells and other drinking water supplies that are not subject to such regulation, corrosion monitoring, and control. Copper pipe is not NSF-certified for use other than for water from "public water supplies" and the NSF-certification indicates that "[w]ater supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water."[71]

Environmental Contamination: Copper from the corrosion of copper potable water pipe in residential buildings has been documented as a significant source of copper in the point source discharges of some municipalities. This has resulted in violations of waste discharge requirements adopted by the California EPA, under the Federal Clean Water Act and the California Porter-Cologne Act. CPVC has been identified as a feasible pollution prevention tool for copper contamination by the City of Palo Alto. The Lead Agency concludes that this pollution prevention tool should be available to all Californians.

4.3.2 Regulatory Setting

4.3.2.1 Water Resources Control Boards

The state's water quality is regulated through the Porter-Cologne Water Quality Control Act (**Porter-Cologne**).[72] The State Water Resources Control Board (**SWRCB**) has ultimate jurisdiction. However, the Regional Water Quality Control Boards (**RWQCBs**) (collectively: **Boards**) have been established to manage water quality locally on a more localized level. The SWRCB and the Boards control water quality through the regulation of the discharges of unsafe levels of chemicals into the state's waters. The Boards have the authority to implement and enforce the water quality laws, regulations, policies and plans to protect the groundwater and surface waters of the state from degradation".

The solvent discharges of CPVC Adhesives do not rise to the level of a "Hazardous Substance" under Porter-Cologne. A "Hazardous Substance" under Porter-Cologne

[70] *Ibid.*
[71] NSF Restriction Statement: Copper tube (Alloy C12200).
[72] California Water Code section 13000 et seq.

does not include a substance that is discharged to a surface water in a quantity less than a reportable quantity as determined by regulations issued pursuant to Section 311(b)(4) of the Federal Water Pollution Control Act (**FWOCA**).[73] Regulations for these quantities are found in 40 Code of Federal Regulations part 302.4 (2005). Table 2 lists the chemicals that may be expected to be released for a short time following CPVC pipe installation and the FWOCA reportable quantity limits.

Table 1: FWOCA Reportable Quantities

Chemical	**Reportable Quantity (pounds)**
Acetone	5000
Cyclohexanone	5000
Methyl ethyl ketone	5000
Tetrahydrofuran	1000

During CPVC plumbing installation, the CPVC Adhesives are not reasonably anticipated to be discharged into surface water in the quantities listed. Discharging thousands of pounds of solvents would require quantities of CPVC Adhesives that are not ordinarily encountered in residential construction.

Another component of the regulatory setting is the NSF International/ American National Standards Institute (**NSF/ANSI**) “Standard 61 Drinking Water System Components – Health Effects” (NSF/ANSI 61). This standard is intended to cover specific materials or products that come into contact with: drinking water, drinking water treatment chemicals, or both. The products and materials covered include pipes and sealing materials (including solvent cements). The Standard provides a means of evaluating contaminants or impurities imparted indirectly to drinking water and it establishes minimum health effects requirements for the chemical contaminants and impurities that may be leached into drinking water from products used in drinking water systems.

Certification against NSF/ANSI 61 has replaced the EPA Additives Advisory Program for drinking water system components. EPA terminated its advisory role in April 1990. The EPA recognizes NSF/ANSI Standard 61 as the criteria for determining the health effects acceptability of water contact materials as referenced in Federal Register Notices: Vol. 53, No. 130 July 7, 1988, and Vol. 62, No. 163 August 22, 1997.

NSF/ANSI Standard 14: Plastics piping system components and related materials (NSF/ANSI 14) is another relevant regulatory feature. This standard establishes physical and performance requirements that apply to plastic piping system components.

[73] Water Code section 13050(p)(2)(C)

The standard also applies to materials (resin or blended compounds) and ingredients used to manufacture plastic piping system components.

California requires CPVC pipe to meet the requirements of NSF 61 and NSF 14 in order to be eligible for use in residential potable water distribution. The proposed Project does not change this requirement.

Total Allowable Concentration Levels: Since the 2000 MND was certified in 2000, three Total Allowable Concentration (**TAC-$H_2$0**)[74] and Single Product Allowable Concentration (**SPAC**) levels have been lowered. The new levels are displayed in Table 3.

Table 2: NSF TAC/SPAC Standards

CHEMICAL	**TAC-$H_2$0**	**SPAC**	**SOURCE**
MEK	4 mg/L	0.4 mg/L	Oral RfD on USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 09/10/2003
Acetone	6	0.6	Derived from the oral RfD on the EPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 6/23/03
Cyclohexanone	30	3	NSF action level External peer review date: 4/26/02

A SPAC is the maximum concentration of a contaminant in drinking water that a single product is allowed to contribute.[75] A TAC- $H_2$0 is the maximum concentration of a nonregulated contaminant allowed in a public drinking water supply.[76] This system of setting maximum levels is intended to identify the human health risks that may be posed by substances conveyed to drinking water under the normal anticipated use of the products. The maximum allowable levels are established based on toxicology data, risk assessment studies, and the level at which the contaminant is leached into the water.

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[74] The acronym "TAC-$H_2$0" is being used to avoid confusion with TAC (toxic air contaminant which is used elsewhere in this EIR.

[75] *Drinking water system components Health effects,* NSF/ANSI 61 – 2005.

[76] *Drinking water system components Health effects,* NSF/ANSI 61 – 2005.

4.3.2.2 Regulation of Disinfection Byproducts

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against harmful waterborne microbial pathogens. However, disinfectants, such as chlorine, react with naturally occurring organic and inorganic matter in source water and distribution systems to form disinfection byproducts (**DBPs**) that may pose health risks. DBPs have been associated with increased risks for cancer and reproductive and developmental health effects.

The first rule to regulate DBPs was promulgated in 1979. 77 The Total Trihalomethanes Rule set a maximum contaminant level (**MCL**) of 0.10 mg/L for total trihalomethanes (**TTHM**). This TTHM standard applied only to community water systems that used surface water and/or ground water that served at least 10,000 people and that added a disinfectant to the drinking water during any part of the treatment process.

The Stage 1 rule, finalized in 1998[78], applies to all community and nontransient noncommunity water systems that add a chemical disinfectant to water. The rule established maximum residual disinfectant level goals (**MRDLGs**) and enforceable maximum residual disinfectant level (**MRDL**) standards for three chemical disinfectants--chlorine, chloramine, and chlorine dioxide; maximum contaminant level goals (**MCLGs**) for three trihalomethanes (**THMs**), two haloacetic acids (**HAAs**), bromate, and chlorite; and enforceable maximum contaminant level (**MCL**) standards for TTHM, five haloacetic acids (**HAA5**), bromate (calculated as running annual averages (**RAAs**)), and chlorite (based on daily and monthly sampling). The Stage 1 rule uses two groups of DBPs as indicators for the various byproducts that are present in water disinfected with chlorine or chloramines: THMs and HAA5. Under the Stage 1 rule, water systems that use surface water, or ground water under the direct influence of surface water and that use conventional filtration treatment are required to remove specified percentages of organic materials, measured as total organic carbon (**TOC**), that may react with disinfectants to form DBPs. Removal is achieved through enhanced coagulation or enhanced softening, unless a system meets one or more alternative compliance criteria.

The EPA recently announced new regulations for disinfectants and disinfection byproducts control.[79] The regulations apply to community and nontransient

[77] National Interim Primary Drinking Water Regulations; Control of Trihalomethanes in Drinking Water. 44 FR 68624, November 29, 1979

[78] National Primary Drinking Water Regulations; Disinfectants and Disinfection Byproducts; Final Rule. 63 FR 69390, December 16, 1998. http://www.epa.gov/safewater/mdbp/dbpfr.pdf.

[79] Federal Register January 4, 2006, Vol 71 No 2 page 387 – 493

noncommunity water systems that add a primary or residual disinfectant other than ultraviolet light or that deliver water that has been treated with a primary or residual disinfectant other than ultraviolet light.[80] The new rule finalizes the proposed Stage 2 MCLG for trichloroacetic acid of 0.02 mg/L and sets an MCLG for monochloroacetic acid of 0.07 mg/L. EPA is not changing the other MCLGs finalized in the Stage 1 rule. [81]

The provisions of the Stage 2 rule focus first on identifying the higher risks locations in the distribution system through the Initial Distribution System Evaluation (**IDSE**). The rule then addresses reducing exposure and lowering DBP peaks in distribution systems by using a new method to determine MCL compliance (locational running annual average (**LRAA**)), defining operational evaluation levels, and regulating consecutive systems.

The new regulations became effective March 6, 2006. The new regulations did not change the MCL for TTHM (0.080 mg/L) or for HAA5 (0.06 mg/mL). The California Department of Health Services has adopted the Federal MCL for TTHM.

4.3.3 Thresholds of Significance

As described in the above discussion of the regulatory setting, public agencies that regulate the state's drinking water and water quality have established standards to protect human health and the environment. In addition, there are private voluntary quality and health standards for CPVC products established by NSF/ANSI.

According to CEQA Guidelines Appendix G, a proposed project would result in significant adverse impacts related to water quality if it would:

1. Violate any water quality standards or waste discharge requirements; or
2. Otherwise substantially degrade water quality.

4.3.4 Impacts and Mitigation Measures

<u>Impact 4.3-1</u>: Leachates

As discussed above in Section 4.3.1, "Environmental Setting," contamination of drinking water and receiving waters of the State by copper plumbing materials now in use is a

[80] Federal Register January 4, 2006, Vol 71 No 2 page 387 – 493

[81] National Primary Drinking Water Regulations: Stage 2 Disinfectants and Disinfection Byproducts Rule; National Primary and Secondary Drinking Water Regulations: Approval of Analytical Methods for Chemical Contaminants; Proposed Rule. 68 FR 49548, August 18, 2003.

reality. Similarly, there is the potential that materials within CPVC or materials used in CPVC installation could contaminate the water carried through the pipe. CPVC pipe and fittings are joined together using cements, and sometimes primers (collectively: **Adhesives**), that contain solvents including acetone, tetrahydrofuran, methyl ethyl ketone, and cyclohexanone.

For over 20 years, the state has approved for residential structures the use of ABS plastic pipe for drain/waste/vent (D/W/V), PVC or CPVC for street water mains, and PVC for the service line from the street water main to the house. The 2000 MND also permitted the statewide use of CPVC inside residential structures if specific findings were made, and worker safety and flushing requirements were met. According to estimates provided by the plumbing industry, since 2001 approximately 11.6 million feet of CPVC pipe have been shipped to California for use in construction under current permitted uses. Most of these permitted uses of plastic pipe have used similar types of Adhesives for installation and both the pipes and Adhesives are routinely transported and used at construction sites. The Lead Agency has found no information in the record to support a finding of adverse environmental impacts due to the existing statewide use of NSF-certified CPVC Adhesives when used according to manufacturer's instructions and in compliance with the laws of California.

Throughout the history of the environmental review of CPVC, various commenters have suggested that tributyltin ("TBT") is a component of CPVC, and that increased use of CPVC will lead to contamination of already stressed water bodies as a result of flushing and additional contamination from TBT and other organotins that will result from such flushing. This is not a new issue or impact of the currently Proposed Project, because the 2000 MND acknowledged that some organotins are used as stabilizers in CPVC, and the 2000 MND evaluated water quality impacts and concluded there would be no significant impacts of the project analyzed in the 2000 MND (i.e., approval of the use of CPVC pipe for residential potable water systems subject to the Findings Requirement). Also, the issue of TBT and claims of possible contamination from TBT and other organotins was evaluated in the 1998 EIR that is part of the administrative record supporting the 2000 MND.

The 1998 EIR concluded that TBT is not a component of CPVC and that significant environmental contamination from organotins would not occur as a result of CPVC use. This evidence already in the record at the Lead Agency confirms that this issue is not new, that there is no new or substantially more severe significant impact, and that no further analysis of this issue is required in this Subsequent EIR.

The 1998 EIR included substantial analysis of the potential environmental impacts related to organotins which could arise from the statewide approval of CPVC, and that analysis included a discussion of TBT (which the 1998 EIR referred to as "TBTO").[82] The 1998 Final EIR indicated that "TBTO is not added to CPVC. The organotins used as stabilizers in CPVC are far less toxic than TBTO."[83] Similarly, the 1998 Final EIR stated that issues raised by the California Pipe Trades Council regarding TBT were irrelevant because "[t]ributyltin is not an ingredient of CPVC, and if it is present as a trace impurity (which has not been confirmed), the concentrations would be so low as to be undetectable in leaching from pipe and not significant."[84] Moreover, the Final EIR indicated that the Lead Agency had "reviewed literature reports of organotin leaching from CPVC and [found] that the reported values are much lower than the applicable standards."[85]

<u>Similarly, the 1998 Final EIR concluded:</u>

> In reviewing the available information on organotin leaching from CPVC pipe, the Lead Agency does not find evidence to suggest that environmental contamination would occur at levels that would constitute a significant impact of the proposed use of CPVC for potable water piping in residential buildings in California. The highly toxic organotin TBTO is simply not present in CPVC except perhaps as a trace contaminant at extremely low concentrations with no human health or other environmental significance. This is not a potential impact associated with the proposed use of CPVC.[86]

In addition, the responses to comments in the 1998 Final EIR stated that "[t]he Lead Agency considers organotin leachate contamination to be less than significant. The Lead Agency considers the established, human health risk assessment based organotin leachate limitations summarized in this EIR and assured by NSF testing and certification to be adequately protective of human health."[87]

Also, the 1998 EIR recognized that CPVC pipe and the fittings, primers and cements used with CPVC are already among the materials already approved for use in public drinking water systems.[88] The solvents in these primers and cements used in public systems are the same solvents that would be used to join CPVC pipe in residential

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[82] 1998 Final EIR at 48-51, 168, 172-174.
[83] 1998 Final EIR at 50.
[84] 1998 Final EIR at 172.
[85] 1998 Final EIR at 49.
[86] 1998 Final EIR at 50.
[87] 1998 Final EIR at 173.
[88] 1998 Final EIR at 42.

buildings.[89] Thus, these materials are already part of the existing environment and are currently in contact with the state's drinking water.

These evaluations in the 1998 EIR are part of the record that supports the 2000 MND, and it is appropriate to rely on these evaluations in determining whether the currently Proposed Project would have any new or additional impacts. These prior evaluations were part of the basis for the Lead Agency's determinations in the 2000 MND, located at page 1 of the Explanation of Checklist Judgments, where the Lead Agency stated "The determinations made for this Environmental Checklist are based on information in the record for this project as well as information in the record of previous HCD examinations of CPVC for use in residential buildings." Many of the specific topical entries in that Environmental Checklist repeat this statement, and recite environmental impact conclusions that are substantially similar to the conclusions in the 1998 EIR.

The absence of any significant organotin impacts, and the fact that this is not a "new" issue, is also confirmed by the U.S. Environmental Protection Agency's 1983 review of organotins and certain other compounds in response to a request from the Federal Interagency Testing Committee. That review evaluated organotin exposures in the environment, including exposure from the manufacture and distribution of CPVC, and found that the environmental exposure to organotins is "extremely low." That review also found that most of the exposure that did occur was primarily from tributyltin pesticides, which degrade in the environment into mono- and dibutyltin compounds. The report concluded "Neither has EPA found evidence that the current manufacture, distribution in commerce, processing use or disposal of these substances may present unreasonable risk of injury to the environment"[90]

The California Plumbing Code already requires that CPVC plastic pipe that will be used in California for residential potable water distribution meet NSF/ANSI Standard 61 - Drinking Water System Components and the NSF/ANSI Standard 14 Plastic Piping System Components and Related Materials Standard. These certifications can only result from findings that concentrations of leached materials from the CPVC plumbing system products, materials, and ingredients (including all chemicals, contaminants, or impurities in the product) that came in contact with the water did not result in any unacceptable toxicological levels. Furthermore, NSF/ANSI-certified CPVC products will have satisfied an extensive risk assessment protocol (incorporating both EPA and DHS approved methodologies.

[89] *Ibid.*

[90] U.S. E.P.A., Alkyltin Compounds, Response to the Interagency Testing Committee, 48 Fed. Reg. No. 217, pp. 51361, 51364.

NSF testing and certification is relied upon by other public agencies in California in several other programs related to safety and suitability of materials that come into contact with drinking water. The appendices to the 1998 EIR, which are also included in the record supporting the 2000 Mitigated Negative Declaration, include a letter from NSF describing NSF's process for evaluating formulation changes.[91] The letter describes this process as follows:

> NSF has an established process for determining the acceptability of formulation changes. Manufacturers of materials and ingredients are required to notify NSF prior to any change to the material or its ingredients. . . . Program Policy 31, *Materials or Compounds Used in Certified Products* and Program Policy 28, *Use of Unauthorized Materials, Compounds or Ingredients*, provide the specific NSF requirements. The proposed change is reviewed by NSF and a determination made as to its acceptability. This includes both review of the information on specific ingredients used and any testing necessary to determine compliance of the final product. It should be noted that NSF Certified products can only be produced from materials authorized by NSF. Unauthorized changes to the formulation is not permitted.[92]

The letter also describes NSF's process for monitoring compliance with this requirement and its enforcement procedures.[93] Based on review of the NSF standards and testing, the Lead Agency considers NSF testing and certification to meet existing standards to provide a reasonable and conservative presumption and assurance of safety.

Since the approval of the 2000 MND in 2000, NSF has lowered the Total Allowable Concentration and Single Product Allowable Concentration for acetone, cyclohexanone, and methyl ethyl ketone. Given that the allowable levels were lowered and not raised, and that CPVC products will thus be subject to more stringent standards, there is not likely to be a significant adverse environmental impact associated with this new information.

[91] 1998 Final EIR, Appendix E.3, Letter from James G. Kendzel, Vice President, Quality Assurance, NSF International to Robin Reynolds, Department of Housing and Community Development, Legal Affairs Divisions at p.8 (Oct. 19, 1998).

[92] 1998 Final EIR, Appendix E.3, Letter from James G. Kendzel, Vice President, Quality Assurance, NSF International to Robin Reynolds, Department of Housing and Community Development, Legal Affairs Divisions at p.8 (Oct. 19, 1998).

[93] *Ibid.*

Mitigation measures either are already in place to minimize or eliminate potential adverse impacts. The California Plumbing Code currently requires flushing of all potable water systems prior to use, regardless of the type of material used. This is also required by the Uniform Plumbing Code. This is a standard practice in the plumbing industry. It is intended to reduce the concentrations of foreign materials that generally occur in newly installed plumbing systems. The proposed Project will not modify or delete this flushing requirement, which will continue to apply to the installation of all CPVC potable water systems in residential buildings throughout the state.

Moreover, as discussed in Section 3.5.2 of this EIR, allowing the use of CPVC for residential potable water systems on a statewide basis without the Findings Requirement is estimated to eventually increase CPVC's share of the potable water pipe market from 13 percent to 32 percent, with a corresponding decrease in copper's market share. This decrease will result in a reduction of the water quality impacts associated with the current use of copper, which are described in Section 4.3.1.2 of this Chapter. Those impacts include: toxicity from leaching of copper pipe, which can result in gastrointestinal illness after short-term exposure to contaminated drinking water and liver or kidney damage after long-term exposure; leaching of lead and other chemicals from the use of solder, flux, and cutting fluids; and environmental contamination of water bodies due to copper corrosion with associated adverse impacts on aquatic water systems. This decrease in the market share of copper pipe will also decrease the amount of water that is wasted by consumers following recommendations to run taps for one to two minutes prior to use in order to avoid excessive copper intake. As explained above in Section 4.3.1.2 of this Chapter, if all California households followed this recommendation, 13.5 million gallons per day of water potentially would be wasted.

Because the Project will not result in any new impacts related to leachates and the existing flushing mitigation measure will continue to apply, leachates resulting from the Project will not violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality Therefore, impacts of the Proposed Project related to leachates will be less than significant.

<u>Impact 4.3-2</u>: Disinfection Byproducts (DBPs)

Freshly installed CPVC plumbing systems can leach organics into drinking water that may serve as DBP precursors. As discussed in the Regulatory Setting section of this chapter, the EPA has promulgated new rules relating to disinfection byproducts, but those rules do not change the MCLs of THM or HAA5 that were established in 1998. Disinfection byproducts standards are based on lifetime exposures and CPVC plumbing is not expected to have long-term leaching of chemicals that may be precursors to disinfection byproducts. The regulatory limits for DBPs also include margins of safety to protect human health.

The NSF/ANSI Standard 61 regulates TTHM leachates from CPVC products (pipe and cement) and sets a limit that is 10 percent of the EPA MCL. Thus, the EPA allows water to have up to 0.08 mg/L of TTHM and 0.06 mg/L of HAA5, but NSF/ANSI certified CPVC products can only contribute up to 0.008 mg/L of TTHM and 0.006 mg/L of HAA5. Since the NSF/ANSI standard is based on the EPA standard, any future change in the EPA standard will result in a corresponding change in the NSF/ANSI standard.

Given the nature of the regulatory controls for DBPs as well as the assurances of NSF/ANSI certified CPVC products, CPVC products used in California will meet the current standards and not significantly contribute quantities of indicator DBPs or DBP precursors. NSF/ANSI 61 certification requires testing against established, health-conservative standards and provides assurance that CPVC products used in California will meet the current standards and not significantly contribute to exceeding the MCL for THMs. Moreover, the use and installation of CPVC plumbing for potable water is not expected to contribute significantly to the formation of disinfection byproducts.[94] Therefore, the Project will not violate any water quality standards or waste discharge requirements related to disinfection byproducts or otherwise substantially degrade water quality, and impacts of the Proposed Project related to disinfection byproducts will be less than significant.

[94] Letter from California Department of Health Services, Drinking Water Program, dated October 21, 1998 in response to a request for a review of certain portions of a draft EIR for CPVC pipe from 1989. (Doc.223, also found in Appendix E, page 95 of the Final EIR dated November 1998, State Clearinghouse No. 970820040.

4.4 Worker Safety

4.4.1 Environmental Setting

As mentioned previously, this EIR is limited to the impacts associated with the Proposed Project. The Proposed Project is the removal of the Findings Requirement, which served as a prerequisite to local approvals of CPVC installations, from the current California Plumbing Code. CPVC has already been approved for residential use in circumstances where a local building official makes the required findings, and the Project would allow use of CPVC for residential plumbing without such findings. Removal of the Findings Requirement would likely result in an increase in CPVC installations for potable water distribution in residential structures. However, the specific worker safety impacts associated with each installation of CPVC plumbing would be identical to those that currently exist in areas where CPVC use has been allowed after the local building official has made the required findings, since the existing worker safety mitigation measures in the current California Plumbing Code would remain in place and would continue to apply to all installation of CPVC for use in residential potable water systems.

The 2000 Mitigated Negative Declaration ("2000 MND") analyzed the impacts associated with conditional CPVC use (by virtue of the Findings Requirement), including potential impacts related to worker safety. The Project analyzed in the 2000 MND included the incorporation of certain worker safety mitigation measures related to ventilation and glove use into Section 301.0 of Appendix I, Installation Standards, of the California Plumbing Code. The proposed project would remove the Findings Requirement, but would leave these worker safety measures intact, and they would continue to apply to all installation of CPVC pipe within residential structures. Removal of the Findings Requirement may result in an increase in the number of residential units plumbed with CPVC pipe. However, an increase in the overall number of units plumbed with CPVC pipe will not increase the extent of an individual installer's exposure to CPVC pipe adhesives during installation in an individual unit. Through the 2000 MND, it was determined that there were no potential significant impacts on worker health and safety due to worker exposure to CPVC pipe adhesives when installations are performed pursuant to the mitigation measures. In this EIR, the Lead Agency will only consider worker impacts which are associated with increased use of CPVC across the state (not within a particular household), as well as any new information related to individual-unit use that was not available or could not have been known at the time the 2000 MND was approved.

As explained in Section 3.5.2 of this Recirculated Draft EIR, the estimated current market share of CPVC pipe in California (subject to the Findings Requirement) is 13%, with copper pipe making up an estimated 53.5% of existing water pipe use and 33.5%

attributed to all other materials. This section first discusses the current use of CPVC for residential plumbing systems at this percentage of market share and then discusses the current use of copper.

4.4.1.1 Current CPVC Use

For over 20 years, the State has approved for residential structures the use of ABS plastic pipe for drain/waste/vent (D/W/V), PVC or CPVC for street water mains, and PVC for the service line from the street water main to the house. The current California Plumbing Code allows the use of CPVC products for residential potable water distribution if specific findings are made, and worker safety and flushing requirements are met. According to estimates provided by the plumbing industry, since 2001 approximately 11.6 million feet of CPVC pipe have been shipped to California for use in construction under current permitted uses. The Lead Agency is proposing to eliminate the requirement that, prior to approving the installation of CPVC as a potable water plumbing material, a local building official must find that there is or will be a premature failure of metallic pipe due to existing water or soil conditions (the "Findings Requirement"). The current worker safety and flushing requirements would remain as part of the California Plumbing Code and would continue to apply to all installation of CPVC for residential potable water use.

Proper use and installation of CPVC piping plays a significant role in maintaining workers' safety and a number of detailed installation instructions are readily available.[95] The following is not intended to be a complete summary of the installation process but only provides an overview for the purposes of this review. In general, the first step involves preparing the proper sized CPVC pipe, which may include cutting, deburring or beveling, and cleaning the pipe.[96] Water supply piping should carry the National Sanitation Foundation's "NSF-pw" approval, meaning the parts are suited for carrying potable, or drinkable, water.[97]

Step two involves application of solvent cement, which can be done with or without primer, and assembly of the pieces to be joined.[98] It is important to use the solvent or

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[95] *See, e.g., Working With Plastic Pipe*, ACE Hardware, http://www.acehardware.com/sm-working-with-plastic-pipe--bg-1280920.html (last accessed Oct. 31, 2006); *Flowguard Gold Joining Guide*, http://www.flowguardgold.com/Guides/FGGCorzan_Joining_Guide.pdf (last accessed Oct. 31, 2006); IPS Weld-on, *Guide to Solvent Cementing PVC and CPVC Plastic Pipe and Fittings*, www.ipscorp.com/weldon/howto.html (last accessed Oct. 31, 2006).

[96] *Flowguard Gold Joining Guide*, p. 2.

[97] *Working With Plastic Pipe*, ACE Hardware, http://www.acehardware.com/sm-working-with-plastic-pipe--bg-1280920.html, last accessed October 31, 2006.

[98] IPS Weld-on, *Guide to Solvent Cementing PVC and CPVC Plastic Pipe and Fittings*, pp 5-10.

primer applicator or dauber when applying to avoid contact. If contamination of gloves occurs during application, the gloves should be disposed of immediately and any exposed skin should be washed thoroughly.[99] This is required by Section 3.01.0.2.2 of Appendix I, Installation Standards, California Plumbing Code, which provides that gloves must be worn during installation of CPVC within residential structures, and the gloves "shall be replaced upon contamination by cements." Cements and primers (collectively, "Adhesives") contain four solvents: acetone (ACE), cyclohexanone (CHX), methyl ethyl ketone (MEK), and tetrahydrofuran (THF). These solvents are volatile (i.e., they evaporate readily). Several alternatives to traditional primers now exist for CPVC use. Low-VOC Adhesives have recently been developed with reduced concentrations of volatile organic compounds (VOCs) other than acetone. Alternatively, "one-step" cements eliminate the use of primers altogether. Both of these newer formulations have been certified by NSF for safety and suitability.[100] The final step involves installing and securing the piping as needed for the job.[101]

To ensure a safe working environment, installers should always follow recommended procedures on product labels and in the Material Safety Data Sheets for CPVC solvents. Additionally, as part of the Project that was analyzed in the 2000 MND, certain worker safety measures were incorporated into the California Plumbing Code for CPVC pipe installations. Specifically, Appendix I, Installation Standards, of the California Plumbing Code was amended to include the following sections that currently apply to the installation of CPVC in residential structures:

> **301.0.2 Worker Safety Measures**
>
> **301.0.2.1** Mechanical ventilation sufficient to maintain exposures below the relevant exposure limits established by state regulations shall be provided in enclosed spaces. This ventilation shall be directed at the breathing zone of the worker installing the pipe. Where mechanical ventilation is not practical, respirators, suitable for organic vapors, shall be used. For the purpose of this subdivision, and enclosed space is defined as:
>
> (a) A space less than 100 square feet of floor area under a ceiling with a height of 10 feet or less, and which does not have openings (consisting of doors, windows, or unfinished walls) on at least two sides;

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[99] IPS Weld-on, *Guide to Solvent Cementing PVC and CPVC Plastic Pipe and Fittings*, p. 18; *Flowguard Gold Joining Guide*, p. 2.

[100] NSF Certified Product Listings, Plastics piping system components and related materials, NSF Standard 14; http://www.nsf.org/business/plastics_piping/faq.asp?program=PlasticsPipSysCom (last accessed Oct. 31, 2006).

[101] *Working With Plastic Pipe*, ACE Hardware, http://www.acehardware.com/sm-working-with-plastic-pipe--bg-1280920.html (last accessed Oct. 31, 2006).

(b) Crawl spaces having a height of less than three feet;
(c) Enclosed attics that have a roof and ceiling; or
(d) Trenches having a depth greater than twenty-four 24 inches.

301.0.2.2 Installers of CPVC pipe within residential structures shall use non-latex thin gauge (4 millimeters) nitrile gloves, or other gloves providing an equivalent or better degree of protection during the installation of the CPVC plumbing system. Gloves shall be provided to all workers by the contractor, or plumbing subcontractor, and shall be replaced upon contamination by cements.

Proper worker training and orientation also plays an essential role in reducing construction-related injuries to plumbers and pipefitters.[102] Safety education and training in the form of safety orientation has been shown to lower workplace injuries by as much as seventy-seven percent.[103] Thus, following proper training practices is expected to lead to decreased injury levels.[104]

4.4.1.2 Current Copper Use

Currently, the majority of the potable water pipe installed in residential buildings in California is made of copper. The steps in the installation of copper pipe include: (i) the pipe is cut to desired length via a power or hand saw; (ii) the pipe ends are reamed to remove any burs and to smooth edges; (iii) ends are prepped by application of flux to further remove impurities, oxides, and dirt; (iv) ends are put together and heated via a propane torch or other heat source; and (v) solder is used to bond the two pieces of pipe together.[105] Because the installation of copper pipe presents inherent risks, the installer should wear gloves to prevent cuts and avoid dermal exposure to flux and solder, goggles to avoid eye hazards, and in poorly ventilated areas, a half-face mask with a fume filter to prevent the inhalation of heavy metals from the flux and solder fume.[106]

The application of flux presents dangers to an installer if not done correctly. Flux is a corrosive mixture that functions to remove residual traces of oxide, to provide a barrier from oxidation during heating, and to facilitate the even spreading of the heated solder

[102] Kinn, S., Khuder, S., Bisesi, M., and Wooley, S., *Evaluation of Safety Orientation and Training Programs for Reducing Injuries in the Plumbing and Pipefitting Industry*, Journal of Occupational and Environmental Medicine, 2000, pp. 1142-47.
[103] *Ibid.* at p. 1145.
[104] *Ibid*. at p. 1147.
[105] Expert Report of Robert G. Tardiff, Ph.D, submitted in *BF Goodrich v. Village of Lake in the Hills*, Illinois, 1997, at p. 6.
[106] Expert Report of Robert G. Tardiff, Ph.D, at p. 7.

throughout the joint.[107] Care must be exercised during the application because of the corrosive nature of the flux and potentially harmful fumes.[108] Adverse health effects may also result for the installer from dermal exposure if improperly installed.[109]

As is the case with flux, care must be exercised during the heating of the pipe to avoid harmful inhalation of tin, antimony, and/or lead fumes.[110] To solder pipe together, solder is heated and allowed to seep in and around the joint to form a seal. Solder is typically an alloy of tin and either lead or antimony. Although federal law has banned the use of solder composed of highly toxic 50% lead (and 50% tin) for all potable water systems, such banned solder is still used for some heating, ventilation, air conditioning, drainage and other piping systems so its ready availability presents a risk that it may be used in potable water systems.

Lead in solders poses unique health risks to workers. Materials in the low-lead solders can cause skin, eye and lung hazards, possibly resulting in respiratory irritation, fevers, chills, muscular pain, vomiting, and sweating from inhalation of fumes.[111] Fume contact with skin or eyes may also cause irritation, and ingestion can cause abdominal pain, internal cuts and obstructions. Target organs are the eyes, skin, respiratory system, cardiovascular system, liver, kidneys, and nasal septum.[112] Currently, lead content is limited by law to less than 0.2 percent but even these low concentrations may cause lead poisoning hazards with repeated exposure. Metal fume monitoring of plumbers has found measurable exposures in workers but at levels lower than established limits for full shift exposures.[113]

A 1989 study by the California Department of Health Services (DHS) recorded workers installing copper pipe with lead solders in their toolboxes, and two workers tested positive for lead exposure.[114] No explanation was offered in the report but lead-based solders are less expensive than the low-lead solders required by law, as well as easier to use for repair work because the lead solders have superior flow and wetting characteristics in a wider range of temperatures.[115] Therefore, there are several

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[107] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.
[108] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.
[109] Expert Report of Robert G. Tardiff, Ph.D, at pp. 12-13.
[110] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.
[111] 1998 Final EIR at pp. 119-21.
[112] 1998 Final EIR at p. 121.
[113] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 25 (Cal. Dep't of Health Servs., Apr. 1989).
[114] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 25 (Cal. Dep't of Health Servs., Apr. 1989).
[115] 1998 Final EIR at p. 120.

incentives for workers to use lead solders despite their illegality and the soldering of copper pipes for residential potable water piping likely produces some amount of lead exposure hazard to workers and consumers.[116] DHS also raised concerns during review of the 1998 EIR about the apparent continued use of lead-based solders by installers of copper pipe.[117]

During soldering, toxic and carcinogenic smokes and vapors are produced and released into the workplace atmosphere.[118] A recent study measured organic vapors generated during soldering of copper pipes when using “water soluble flux” and “water soluble tinning flux.”[119] The tests were conducted according to procedures found in the American Industrial Hygiene Association Journal, July 1990 article “Identification of Organic Vapors from Commercially Available Soldering Fluxes during Simulated Soldering of Copper Plumbing Systems.”[120] The full results of the study are presented in Appendix D and summarized in Table 4.4-1 as follows.

116 1998 Final EIR at p. 120.

117 Katz, E., Acting Chief of the DHS Hazard Evaluation System an Information Service (HESIS), letter regarding the occupational health hazards of work installing CPVC pipe, April 28, 1998.

118 Nikora, J., Olson, A., & Steele, W., *Identification of Organic Vapors from Commercially Available Soldering Fluxes During Simulated Soldering of Copper Plumbing Systems*, American Industrial Hygiene Ass’n Journal, Vol. 51, No. 7, pp. 476-77 (July 1990).

119 Research Triangle Park Laboratories, Inc., Flux Tests; PO Number: PD 01-03735, (Sept. 26-27 2006).

120 Research Triangle Park Laboratories, Inc., at p. 1.

Table 4.4-1 Organic Vapors Derived from Water Soluble Fluxes During Simulated Soldering of Copper Plumbing Systems

CHEMICAL	WATER SOLUBLE FLUX – SAMPLE 1	WATER SOLUBLE FLUX – SAMPLE 2	WATER SOLUBLE TIN FLUX – SAMPLE 1	WATER SOLUBLE TIN FLUX – SAMPLE 2	PRESENCE ON CARB TOXIC AIR CONTAMINANT (TAC) IDENTIFICATION LIST[121]
Chloromethane	Detected	Detected	Detected	Detected	Yes
Vinyl Chloride	Detected	Detected	Detected	Detected	Yes
Bromomethane	Detected	Detected	-	-	
Chloroethane	-	Detected	Detected	-	Yes
Ethanol	Detected	Detected	Detected	Detected	
Carbon Disulfide	-	Detected	Detected	-	Yes
Isopropyl Alcohol	Detected	Detected	Detected	Detected	Yes
Methylene Chloride	Detected	-	Detected	Detected	Yes
Acetone	Detected	Detected	Detected	Detected	
T-1,2-Dichloroethene	Detected	-	Detected	Detected	
Hexane	Detected	Detected	-	Detected	Yes
Methyl-t-butyl Ether (MBTE)	-	-	Detected	-	
Vinyl Acetate	Detected	Detected	Detected	Detected	Yes
Ethyl Acetate	Detected	Detected	Detected	Detected	
Tetrahydrofuran (THF)	Detected	Detected	Detected	Detected	
2-Butanone	Detected	Detected	Detected	Detected	Yes
Heptane	Detected	Detected	Detected	Detected	
Benzene	Detected	Detected	Detected	Detected	Yes
1,2 Dichloroethane	Detected	Detected	Detected	Detected	Yes
Trichloroethylene	-	-	-	Detected	Yes
1,4 -Dioxane	Detected	Detected	Detected	Detected	Yes
Toluene	Detected	Detected	Detected	Detected	Yes

[121] California Air Resources Board, Toxic Air Contaminant (TAC) Identification List, December 1999, http://www.arb.ca.gov/toxics/cattable.htm#Note%201, Category IIa substances (last accessed Nov. 2, 2006).

CHEMICAL	WATER SOLUBLE FLUX – SAMPLE 1	WATER SOLUBLE FLUX – SAMPLE 2	WATER SOLUBLE TIN FLUX – SAMPLE 1	WATER SOLUBLE TIN FLUX – SAMPLE 2	PRESENCE ON CARB TOXIC AIR CONTAMINANT (TAC) IDENTIFICATION LIST[121]
4-methyl-2-pentanone (MIBK)	Detected	Detected	Detected	Detected	Yes
Tetrachloroethylene	-	-	Detected	-	Yes
2-Hexanone	Detected	Detected	Detected	Detected	
Ethyl Benzene	Detected	Detected	-	Detected	Yes
Chlorobenzene	Detected	-	-	-	Yes
M/P-Xylene	Detected	Detected	Detected	Detected	Yes
O-Xylene	Detected	Detected	Detected	Detected	Yes
Styrene	Detected	Detected	Detected	Detected	Yes
Tribromomethane	Detected	Detected	-	-	
1-Ethyl-4-Methylbenzene	Detected	Detected	Detected	Detected	
1,3,5-Trimethylbenzene	-	-	Detected	Detected	
1,2,4-Trimethylbenzene	Detected	Detected	Detected	Detected	
Benzyl Chloride	Detected	Detected	-	-	Yes

This study demonstrates that numerous toxic organic vapors are generated during the copper pipe soldering process. These vapors are released into the workplace atmosphere and can be inhaled by workers, particularly if proper safety procedures and precautions are not followed. While the amount of the vapors potentially inhaled cannot be quantified from this study, it does provide a qualitative view of potential inhalation hazards to copper pipe installers. Furthermore, the study identified particles less than 10 microns in size that were emitted into the air but not accounted for in the tests.[122] As has been shown, particulates below 10 microns in diameter have a greater chance to enter the respiratory system, and particles below 5 microns in diameter are more apt to reach the deep lung or alveolar spaces.[123] For workers with healthy lungs, particles from 5 to 10 microns in diameter are generally removed from the respiratory system by a constant cleansing action that takes place in the upper respiratory tract. However, with

[122] Research Triangle Park Laboratories, Inc., at p. 1.

[123] MSA, *Key Elements of a Sound Respiratory Protection Program*, at p. 3 (Apr. 2004), available at http://media.msanet.com/NA/USA/APR/ConventionallyMaintainedRespirators/ComfoClassicHalfMaskRespirators/1000-61KeyElementsResp.pdf.

excessive “dust” exposures or a diseased respiratory system, the efficiency of the cleansing action can be significantly reduced.[124]

In addition to the foregoing, the installation and repair of copper pipe has other inherent hazards.[125] Hot materials, pipe, fittings, molten solder, flux and the heat source can cause serious thermal burns. The heat source can also start fires, potentially creating immediate safety hazards to workers, residents and firefighters. Incisions, cuts and abrasions result from cutting and de-burring pipe. Copper pipe also poses a risk of electrocution because it is an excellent conductor of electricity. Pressure testing of the piping system also presents a rare but dangerous risk where piping failure results in pieces of failed pipe being propelled outward. Such events can pose risk of very serious injury to anyone struck by the propelled pipe.[126]

Health risks associated with copper pipe installation would not be expected to occur in installers who adhered to recommended installation practices, including but not necessarily limited to, the use of adequate ventilation or wearing of a half-face mask with fume filters, gloves, and goggles as needed.[127] For this reason, based on available data in the record, the inhalation risks associated with copper pipe installation are similar to the installation of CPVC piping because the avoidance and minimization measures for proper installation are nearly identical.[128]

However, the *improper* installation of copper pipe (i.e., without following proper safety procedures) has the potential to present risks to worker health and safety from the inhalation of toxic organic vapors during the soldering process and from exposure to lead in solders. The risks associated with improper installation of copper pipe are no less than, and possibly exceed, the risks associated with improper CPVC installation, discussed below.[129]

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[124] MSA, *Key Elements of a Sound Respiratory Protection Program*, at pp. 3-4.

[125] *See, e.g.,* Kinn, S., Khuder, S., Bisesi, M., & Wooley, S., *Evaluation of Safety Orientation and Training Programs for Reducing Injuries in the Plumbing and Pipefitting Industry*, Journal of Occupational and Environmental Medicine, 2000, p. 1142.

[126] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.

[127] Expert Report of Robert G. Tardiff, Ph.D, at p. 21.

[128] Expert Report of Robert G. Tardiff, Ph.D, at p. 21.

[129] Expert Report of Robert G. Tardiff, Ph.D, at p. 22; Appendix E of the 1998 EIR, DHS toxicologist, letter regarding impacts of CPVC pipe compared to copper pipe..

4.4.2. Regulatory Setting

The U.S. Congress created the Occupational Safety & Health Administration (OSHA) under the Occupational Safety and Health Act in 1970.[130] The Act encourages States to develop and operate their own job safety and health programs, which OSHA approves and monitors.[131] OSHA has approved a California state plan.[132]

The Department of Industrial Relations' Division of Occupational Safety and Health operates the California Occupational Safety and Health Assessment Program (Cal/OSHA). Cal/OSHA is responsible for enforcing California laws and regulations pertaining to workplace safety and health and for providing assistance to employers and workers with workplace safety and health issues. The Cal/OSHA enforcement unit has jurisdiction over every employment and place of employment in California which is necessary to adequately enforce and administer all occupational safety and health standards and regulations.[133] The Cal/OSHA enforcement unit conducts inspections of California workplaces in response to a report of an industrial accident, a complaint about an occupational safety and health hazard, or as part of an inspection program targeting industries which have a high rate of occupational hazards, fatalities, injuries or illnesses.[134] A worker may file a complaint at one of twenty-two district offices.[135] If the investigation shows that the employer has violated a safety and health standard or order, then Cal/OSHA may issue a citation or penalty.[136]

Cal/OSHA regulations set forth exposure limits for airborne contaminants, which are provided in three categories: 1) permissible exposure limits (PELs), 2) short term exposure limits (STELs); and occasionally, 3) ceiling limits. PELs establish safe levels of exposure for workers to established airborne contaminants on daily, weekly (40-hour workweek), and lifetime bases.[137] An employee's exposure to an airborne contaminant in a workday, expressed as an 8-hour time-weighted average (TWA) concentration,

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[130] U.S. Code, Title 29, Section 651 *et seq*.

[131] U.S. Code, Title 29, Section 667.

[132] U.S. Department of Labor, OSHA website. http://www.osha.gov/dcsp/osp/faq.html#oshaprogram (last accessed Nov. 2, 2006).

[133] Cal/OSHA Enforcement website, http://www.dir.ca.gov/dosh/EnforcementPage.htm (last accessed Oct. 31, 2006).

[134] *Ibid*.

[135] Cal/OSHA Enforcement Unit District Offices, http://www.dir.ca.gov/dosh/DistrictOffices.htm (last accessed Oct. 31, 2006).

[136] Cal/OSHA enforcement provisions, http://www.dir.ca.gov/title8/ch3_2sb2a10.html (last accessed Oct. 31, 2006).

[137] Cal. Code of Regulations, Title 8, Section 5155(b).

cannot exceed the PEL set for that substance. The PELs reflect current medical opinion and industrial hygiene practice with doubts being resolved on the side of safety.[138] The STEL is a 15-minute TWA exposure which is not to be exceeded at any time during a workday even if the 8-hour TWA is below the PEL. A ceiling limit is the maximum concentration of an airborne contaminant to which an employee may be exposed at any time.[139]

Certain substances found in the workplace have also been designated by Cal/OSHA regulations as posing a risk to being absorbed into the bloodstream through the skin or other bodily contact.[140] Where these substances are present, employers must provide appropriate protective clothing to prevent skin absorption.[141] Of the chemicals used in CPVC solvents, only cyclohexanone has been designated as requiring protective clothing to prevent skin absorption.[142]

The following table shows the Cal/OSHA exposure limits for the solvents.[143]

Table 4.4-2 Cal/OSHA Exposure Limits for the Adhesives

Solvent	**PEL**		**STEL**		**Ceiling Limit**
	ppm	**mg/m³**	**ppm**	**mg/m³**	
Acetone (ACE)	500	1200	750	1780	3000 ppm
Cyclohexanone (CHX)	25	100	N/A	N/A	N/A
Methyl ethyl ketone (MEK)	200	590	300	885	N/A
Tetrahydrofuran (THF)	200	590	250	735	N/A

N/A -- No applicable Cal/OSHA regulation.

The 2000 MND applied the Cal/OSHA exposure limits then in effect and determined that impacts from worker exposure to CPVC Adhesives would be less than significant when

[138] Cal. Code of Regulations, Title 8, Section 5155(a)(2).

[139] Cal. Code of Regulations, Title 8, Section 5155(b)

[140] Cal. Code of Regulations, Title 8, Section 5155(d)

[141] *Ibid*.

[142] Cal. Code of Regulations, Title 8, Section 5155(d); Cal. Code of Regulations, Title 8, Section, Table AC-1, Permissible Exposure Limits for Chemical Contaminants

[143] Cal. Code of Regulations, Title 8, Section 5155(a)(2); Cal. Code of Regulations, Title 8, Section, Table AC-1, Permissible Exposure Limits for Chemical Contaminants

installations are performed pursuant to the requirements under the mitigation measures that were adopted into the California Plumbing Code. However, subsequent to the adoption of the 2000 MND, Cal/OSHA changed the PEL and STEL for acetone. In 2006, the PEL was lowered from 750 ppm to 500 ppm (1780 mg/m^3 to 1200 mg/m^3), the STEL was lowered from 1000 ppm to 750 ppm (2400 mg/m^3 to 1780 mg/m^3) and a ceiling limit of 3000 ppm was added. The exposure limits were reduced to conform to those established by the American Conference of Governmental Industrial Hygienists (ACGIH) and to protect employees from the irritant effect of high concentrations of acetone.[144]

4.4.3. Thresholds of Significance

The Lead Agency has applied the following thresholds of significance to determine whether the Proposed Project would cause a significant adverse impact to worker health and safety:

1. Regular exceedance of legally enforceable workplace exposure standards for acetone, methyl ethyl ketone, tetrahydrofuran, cyclohexanone, or other toxic contaminants, where workers are following safety and precaution recommendations on material labels and Material Safety Data Sheets as well as the regulations in the California Plumbing Code.
2. Creation of other workplace hazards that would result in significant adverse health or safety consequences to workers, where workers are following safety and precaution recommendations on material labels and Material Safety Data Sheets as well as the regulations in the California Plumbing Code.
3.

4.4.4. Impacts and Mitigation Measures

<u>Impact 4.4-1</u>: Inhalation Exposure to Vapors from CPVC Installation

The issue of worker health and safety related to inhalation of solvents used with CPVC pipe for potable water in residential buildings has been studied in depth. The 1998 Final EIR evaluated and incorporated numerous studies into its analysis including, among others:

- **National Institute for Occupational Safety and Health (NIOSH), Health Hazard Evaluation Report, 81-336.** This study was conducted by NIOSH at the request of the Plumbers and Gasfittters Local Union 12, Boston, Massachusetts, to evaluate the health effects of working with polyvinyl chloride (PVC) pipe

[144] Occupational Safety and Health Standards Board Initial Statement of Reasons for an amendment of Cal. Code of Regulations, Title 8, Section 5155 which was adopted April 20, 2006. (Doc.222)

cements and cleaners (primers). The environmental data did not indicate excessive solvent exposures, and no survey criteria of OSHA standards were exceeded. A definitive link between solvent exposures and reported health effects was not established, although recommendations to reduce solvent exposures in plumbing were made.

- **NIOSH Health Hazard Evaluation Report, 82-293.** This study was conducted by NIOSH at the request of the California Department of Housing and Community Development. Except for one case, air sampling did not record exposures in excess of then-current criteria. However, the acute health affects reported by the plumbers sampled and the uncertainty of the potential toxic effects of exposure to multiple solvents warranted recommendations to minimize exposure.
- **Department of Health Services (DHS), Plastic Pipe Installation: Potential Health Hazards for Workers, 1989.** This report studied possible worker health hazards associated with the installation of plastic pipe, particularly CPVC in residential construction. The 1998 EIR relied heavily on the "conclusions and recommendations" in the 1989 DHS study as "very relevant."[145] Workers installing CPVC and copper pipe, as well as other materials, were monitored for exposure to toxic substances.
- **Independent Review of DHS 1989 Study by Dr. Peter Kurtz**. Toxicologist and medical doctor, Dr. Peter Kurtz, independently reviewed the DHS study and associated toxicologist information, presented in Appendix E of the 1998 EIR. Dr. Kurtz's independent review determined that no significant adverse impacts to worker safety were related to the proposed use of CPVC.[146]
- **Expert Reports of Robert G. Tardiff, Ph.D, and Thomas S. Reid, Submitted in *BF Goodrich v. Village of Lake in the Hills, Illinois*, 1997.** Both of these reports addressed the safety of CPVC piping for installers as part of litigation in the state of Illinois. Reid found that worker exposures could exceed established workplace standards and result in adverse health impacts to workers. Tardiff disagreed and found that CPVC and copper pipe installation present similar hazards to workers and CPVC presents no greater risk to installers than copper pipe. Tardiff found that potential hazards to workers from both CPVC and copper pipe can be avoided by following material label instructions and the Material Safety Data Sheets.

These studies in the 1998 EIR are part of the record that supports the 2000 MND, and it

[145] 1998 Final EIR at p. 56.
[146] 1998 Final EIR at p. 84.

is appropriate to rely on these evaluations in determining whether the currently Proposed Project would have any new or additional impacts. These prior evaluations were part of the basis for the Lead Agency's determinations in the 2000 MND, located at page 1 of the Explanation of Checklist Judgments, where the Lead Agency stated "The determinations made for this Environmental Checklist are based on information in the record for this project as well as information in the record of previous HCD examinations of CPVC for use in residential buildings." Many of the specific topical entries in that Environmental Checklist repeat this statement, and recite environmental impact conclusions that are substantially similar to the conclusions in the 1998 EIR.

Short Term Worker Exposure to ACE, MEK, THF, and CHX. The 1989 DHS study documented short-term worker exposure to ACE, MEK, THF, and CHX during the installation of CPVC piping for residential potable water use.[147] Most workers studied did not follow safety procedures required on product labels or the Material Safety Data Sheets.[148] Concentrations of the solvents were measured in 193-short term (15-minute) air samples under four different sampling "strata" that covered enclosed and unenclosed areas as well as the number of joints cemented per 15-minute sample.[149] The following table represents Cal/OSHA short term exposure limits (STELs).[150]

Table 4.4-3 Cal/OSHA STELs

Solvent	STEL	
	ppm	**mg/m³**
Acetone (ACE)	750	1780
Cyclohexanone (CHX)	N/A	N/A
Methyl ethyl ketone (MEK)	300	885
Tetrahydrofuran (THF)	250	735

Mean short-term exposures for each installation type and sampling type for ACE ranged from 7 ppm to 77 ppm,[151] with a maximum exposure of 208 ppm.[152] Thus, mean STEL

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[147] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 1 (DHS 1989).
[148] *Ibid.* at p. 14.
[149] *bid.* at p. 14. pp. 6, 18.
[150] Cal. Code of Regulations, Title 8, Section 5155(a)(2); Cal. Code of Regulations, Title 8, Section, Table AC-1, Permissible Exposure Limits for Chemical Contaminants.
[151] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 43, Table 6 (DHS 1989).
[152] *Ibid.* at p. 19.

exposures for ACE were less than 11% of the Cal/OSHA limit and the maximum exposure was less than 28% of the Cal/OSHA limit.

Similarly, mean short-term exposures for MEK ranged from 2 ppm to 20 ppm (less than 7% of exposure limit),[153] with a maximum exposure of 95 ppm (less than 32% of exposure limit).[154] Mean short-term exposures for CHX ranged from 0.4 ppm to 1 ppm[155] with a maximum exposure of 7 ppm[156] (Cal/OSHA has not established a STEL for CHX).[157] Mean short-term exposures for THF ranged from 27 ppm to 174 ppm (less than 70% of exposure limit),[158] with a maximum exposure of 529 ppm (211% of exposure limit).[159]

For all of the solvents measured, none of the mean exposures exceeded Cal/OSHA STEL regulations. For ACE, MEK and CHX, even the maximum recorded exposure levels were below 33% of Cal/OSHA exposure limits. Conversely, for THF, six of the 193 measurements exceeded the STEL of 250 ppm, with one sample reaching up to 529 ppm (211% of the exposure limit). However, all six of the THF overexposure measurements occurred in enclosed or partially enclosed areas with very low air flow rates.[160]

The results of the 1989 DHS study indicated that installers of CPVC pipe experienced very low levels of exposure to the solvents even though most workers did not follow safety instructions.[161] Even the few overexposures that did occur were recorded in very low air flow areas.[162] Thus, it is anticipated, based on the data, that improvements in ventilation, as required by following proper safety procedures and the mitigation measures that were included in the California Plumbing Code as part of the Project evaluated in the 2000 MND, would minimize or eliminate these exposure risks.[163] Specifically, Section 301.0.2.1 of Appendix I, Installation Standards, California Plumbing Code requires mechanical ventilation to maintain exposures in enclosed spaces to

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153 *Ibid.* at p. 43, Table 6.
154 *Ibid.* at p. 19.
155 *Ibid.* at p. 43, Table 6.
156 *Ibid.* at p. 19.
157 Cal. Code of Regulations, Title 8, Section 5155(a)(2); Cal. Code of Regulations, Title 8, Section, Table AC-1, Permissible Exposure Limits for Chemical Contaminants.
158 *Ibid.* at p. 43, Table 6.
159 *Ibid.* at p. 19.
160 *Ibid.* at p. 54, Figure 5.
161 *Ibid.* at p. 14.
162 *Ibid.* at p. 54, Figure 5.
163 *See ibid.* at p. vi.

below relevant exposure limits, and where mechanical ventilation is not practical, requires the use of respirators suitable for protecting against organic vapors.

Further, even in the event of improper installation, impacts associated with CPVC pipe installation are expected to be no more, and possibly less, than impacts associated with the improper copper pipe installation.[164] Improper installation of copper pipe exposes workers to a number of risks. Toxic organic vapors and particles less than 10 microns in diameter can be inhaled during the soldering process, exposing workers to contaminants and respiratory harm.[165] Lead-based or low-lead solders may present worker health hazards by causing skin, eye and lung injury, potentially resulting in respiratory irritation, fevers, chills, muscular pain, and vomiting.[166] Other inherent hazards associated with copper pipe installation can present further risks, including burns from propane flames or molten solder, electrocution conducted through copper pipe, and impact injuries resulting from pipe failures.[167]

The 1989 DHS study also noted that the short-term “index of combined exposure” exceeded the limit for six samples.[168] Cal/OSHA regulates exposure to contaminants that may have an additive health effect.[169] Nevertheless, the highest exposure levels experienced by installers occurred in enclosed areas with low ventilation.[170] As such, impacts related to installation in low ventilated areas can be fully avoided or adequately minimized by following proper safety procedures and requirements in Section 301.0.2.1 of Appendix I, Installation Standards, California Plumbing Code, which require mechanical ventilation or respirators as necessary.[171]

Low-solvent-content cements have also been developed as part of a program to reduce emissions of volatile organic compounds (VOCs) from a wide range of products, including the materials used to join CPVC. Specifically two types of CPVC joining materials have been developed: (1) low-VOC primers and cements requiring a two-step application process (i.e., use of both primer and cement), and (2) low-VOC, one-step

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[164] Expert Report of Robert G. Tardiff, Ph.D, at p. 22; Forest, W., Appendix E of the 1998 Final EIR, DHS toxicologist, letter regarding impacts of CPVC pipe compared to copper pipe.

[165] MSA, *Key Elements of a Sound Respiratory Protection Program*, at p. 3 (Apr. 2004), available at http://media.msanet.com/NA/USA/APR/ConventionallyMaintainedRespirators/ComfoClassicHalfMaskRespirators/1000-61KeyElementsResp.pdf.

[166] 1998 Final EIR at pp. 119-21.

[167] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.

[168] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 19 (DHS 1989).

[169] Cal. Code of Regulations, Title 8, Appendix B to Section 5155.

[170] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, Table 6, Figure 5 (DHS 1989).

[171] *See ibid*. at p. vi.

cements (i.e., cements that do not require the use of primers). Low-VOC primers contain the same types of solvents as standard primers (i.e., ACE, CHX, MEK, and THF), but the relative quantity of ACE is increased (ACE is the least toxic of the four solvents) while the relative quantities of the other solvents are decreased.[172] While these low-VOC primers and cements were not tested by the 1989 DHS study, it is anticipated that they would expose workers to lower levels of contamination.[173] Further, use of the one-step cements would eliminate the use of primer altogether – the source of a significant amount of the existing exposure levels – and would likely significantly reduce existing exposure levels.[174]

In conclusion, data demonstrates that the installation of CPVC pipe does not present a significant impact to worker safety from short-term exposures when the proper safety procedures and the California Plumbing Code are followed. Even in the event of improper installation, data shows that installers of CPVC pipe experienced very low levels of exposure to the solvents,[175] and the associated impacts with improper installation are expected to be no more, and possibly less, than impacts associated with the improper installation of copper pipe.[176] As such, impacts related to short-term exposure from installation of CPVC piping for the Proposed Project would be less than significant.

***Full-Shift Worker Exposure to ACE, MEK, THF, and CHX*.** The 1989 DHS study documented full-shift worker exposure to ACE, MEK, THF, and CHX during the installation of CPVC piping for residential potable water use over 60 workdays.[177] Most workers studied did not follow safety procedures required on product labels or the Material Safety Data Sheets.[178] The following table shows Cal/OSHA requirements for full-shift (PEL) limits for the solvents based on a time weighted average over an 8-hour shift.

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[172] 1998 Final EIR at 47.
[173] 1998 Final EIR at 58.
[174] 1998 Final EIR, at 158.
[175] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 14 (DHS 1989).
[176] Expert Report of Robert G. Tardiff, Ph.D, at p. 22; Forest, W., Appendix E of the 1998 Final EIR, DHS toxicologist, letter regarding impacts of CPVC pipe compared to copper pipe.
[177] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 21 (DHS 1989).
[178] *Ibid.* at p. 14.

Table 4.4-4 Cal/OSHA Full-Shift Exposure Limits

Solvent	PEL	
	ppm	mg/m^3
Acetone (ACE)	500	1200
Cyclohexanone (CHX)	25	100
Methyl ethyl ketone (MEK)	200	590
Tetrahydrofuran (THF)	200	590

None of the full-shift exposures for ACE, MEK, THF, and CHX exceeded the full-shift exposure limits set by Cal/OSHA.[179] Mean full-shift exposures for ACE were 16 ppm (less than 4% of exposure limit) and CHX were 0.2 ppm (less than 1% of exposure limit).[180] Exposures for MEK and THX were slightly higher. The MEK mean full-shift exposure was 6 ppm (3% of exposure limit), with a maximum exposure of 45 ppm (22.5% of exposure limit).[181] The THF mean full-shift exposure was 26 ppm (13% of exposure limit), with a maximum exposure of 158 ppm (79% of exposure limit).[182]

The 1989 DHS study noted the full-shift "index of combined exposure" exceeded the limit for one worker.[183] Cal/OSHA regulates exposure to contaminants that may have an additive health effect.[184] Nevertheless, the highest exposure levels experienced by installers occurred in enclosed areas with low ventilation.[185] As such, impacts related to installation in low ventilated areas can be fully avoided or adequately minimized by following proper safety procedures and requirements in Section 301.0.2.1 of Appendix I, Installation Standards, California Plumbing Code, which require mechanical ventilation or respirators as necessary.[186]

Further, as discussed above, impacts associated with improper CPVC pipe installation are expected to be no more, and possibly less, than impacts associated with the

[179] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, p. 22 (DHS 1989).
[180] *Ibid.* at Table 11.
[181] *Ibid.* at p. 22.
[182] *Ibid.* at p. 22.
[183] *Ibid.* at p. 22.
[184] Cal. Code of Regulations, Title 8, Appendix B to Section 5155.
[185] Kizer, K.W., *Plastic Pipe Installation: Potential Health Hazards for Workers*, Table 12 (DHS 1989).
[186] *See ibid*. at p. vi.

improper copper pipe installation.[187] Improper installation of copper pipe exposes workers to a number of risks. Toxic organic vapors and particles less than 10 microns in diameter can be inhaled during the soldering process, exposing workers to contaminants and respiratory harm.[188] Lead-based or low-lead solders may present worker health hazards by causing skin, eye and lung injury, potentially resulting in respiratory irritation, fevers, chills, muscular pain, and vomiting.[189] Other inherent hazards associated with copper pipe installation can present further risks, including burns from propane flames or molten solder, electrocution conducted through copper pipe, and impact injuries resulting from pipe failures.[190]

In summary, mean full-shift exposure levels for CPVC installers were below Cal/OSHA levels even though most workers did not follow safety instructions.[191] Improvements in ventilation, as required by following proper safety procedures and Section 301.0.2.1, Appendix I, Installation Standards, California Plumbing Code, and following other safety protocols would minimize or eliminate these exposure risks even further.[192] As a result, impacts to worker health and safety from full-shift vapor exposure to Adhesives during CPVC installation associated with the Proposed Project will be less than significant.

<u>Impact 4.4-2</u>: Dermal Exposure to Adhesives

Proper installation of CPVC pipe would minimize or eliminate the risk for dermal exposure to Adhesives during installation of CPVC piping. Specifically, Section 301.0.2.2 of Appendix I, Installation Standards, California Plumbing Code requires use of non-latex thin gauge (4 millimeters) nitrile gloves, or other gloves providing an equivalent or better degree of protection, during the installation of CPVC plumbing systems. Of the four solvents in Adhesives, Cal/OSHA regulations only require skin protection for CHX.[193] Nitrile gloves have been shown to provide adequate short term exposure protection for CHX.[194] Section 301.0.2.2 of Appendix I, Installation Standards,

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[187] Expert Report of Robert G. Tardiff, Ph.D, at p. 22; Forest, W., Appendix E of the 1998 Final EIR, DHS toxicologist, letter regarding impacts of CPVC pipe compared to copper pipe.

[188] MSA, *Key Elements of a Sound Respiratory Protection Program*, at p. 3 (Apr. 2004), available at http://media.msanet.com/NA/USA/APR/ConventionallyMaintainedRespirators/ComfoClassicHalfMaskRespirators/1000-61KeyElementsResp.pdf.

[189] 1998 Final EIR at pp. 119-21.

[190] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.

[191] *Ibid.* at p. 14.

[192] *Ibid.* at p. vi.

[193] Cal. Code of Regulations, Title 8, Section 5155(d); Cal. Code of Regulations, Title 8, Section 5155, Table AC-1, Permissible Exposure Limits for Chemical Contaminants.

[194] *See, e.g.*, http://www.chemrest.com/Intermittent%20Data/ICyclohexanone.htm (last accessed Nov. 3, 2006). It should be noted, this test of Nitrile gloves uses the ASTM F1383-92 Test Method (totally immersing the glove 1 minute out of every 10 minutes). However, expected exposure with CPVC piping, with proper use of daubers to apply solvents, would result in much lower glove

California Plumbing Code, requires that nitrile gloves must be discarded and replaced upon contamination, which would make nitrile gloves adequately effective against dermal exposure. However, Adhesives should not contaminate the gloves if daubers are properly used during installation.[195] Thus, the glove mitigation measure included in Section 301.0.2.2 provides a second line of defense for workers, with the first line of defense being the use of daubers or other applicators to prevent direct contact with workers' hands.

In the event of an improper installation (i.e., safety procedures are not followed), possible effects of the solvents include:[196]

- MEK: Irritant to the eyes, mucus and membranes at lower concentrations. Higher concentrations result in erythema, skin-fold thickening, or edema. No studies reported toxicity as a result of prolonged dermal exposure to MEK.
- THF: Mild irritant to eyes, skin and mucus membrane. Repeated skin contact may cause severe irritation, burns and dermatitis. No toxicity reported for prolonged dermal exposure.
- CHX: Moderately toxic by dermal exposure and repeated exposure may cause dermatitis. No studies, however, actually reported toxicity as a result of prolonged dermal exposure.
- ACE: Long term exposure may result in skin dryness and irritation. No toxicity reported as a result of prolonged dermal exposure.

It is expected that even during improper installation, where safety guidelines are not followed, installers of CPVC pipe will only receive dermal exposure at doses that would cause mild adverse effects.[197] More serious health effects, including burns, abdominal pain, and hepatic and renal damage, occur only at much higher levels of exposure than would likely result. In general, evidence suggests that the risks for serious adverse health effects resulting from dermal exposure are low and perhaps occasionally moderate.[198] Furthermore, risks associated with dermal exposure during improper CPVC installation are no greater, and possibly less, than risks for dermal exposure during the improper installation of copper piping.[199]

contamination levels, increasing the life and effectiveness of the glove.

195 *See* IPS Weld-on, Guide to Solvent Cementing PVC and CPVC Plastic Pipe and Fittings, at p. 18; Flowguard Gold Joining Guide, at p. 2.

196 Expert Report of Robert G. Tardiff, Ph.D, at pp. 10-11.

197 Expert Report of Robert G. Tardiff, Ph.D, at pp. 11-12.

198 Expert Report of Robert G. Tardiff, Ph.D, at p. 12.

199 Expert Report of Robert G. Tardiff, Ph.D, at p. 14.

As discussed above, risks associated with dermal exposure can be minimized or eliminated altogether by following proper procedures and safety protocols. Application of Adhesives using daubers, wearing protective gloves, and replacing the protective gloves immediately upon contamination will eliminate the risks associate with dermal exposure to less than significant levels. As such, impacts to worker safety related to installation of CPVC piping for the Proposed Project will be less than significant.

Impact 4.4-3: Carcinogenic Effects from Adhesives

Commenters to the 1998 EIR suggested that THF should be considered a human carcinogen.[200] This issue has been studied in depth and no new information of substantial importance is available that was not considered during the adoption of the 2000 MND.

The U.S. Department of Health Services, National Toxicology Program (NTP), prepares a "Report on Carcinogens" (RoC), which is an informational scientific and public health document that identifies and discusses agents, substances, mixtures, or exposure circumstances that may pose a hazard to human health by virtue of their carcinogenicity.[201] Agents, substances, mixtures or exposures can be listed in the RoC either as "known" to be a human carcinogen or as "reasonably anticipated" to be a human carcinogen. "Known" carcinogens are those substances for which there is sufficient evidence of carcinogenicity from studies in humans that indicates a cause and effect relationship between the exposure and human cancer. "Reasonably anticipated" carcinogens are those substances for which there is limited evidence of carcinogenicity in humans and/or sufficient evidence of carcinogenicity in experimental animals. The most current RoC is the 11th Edition.[202] None of the solvents present in CPVC Adhesives are listed in the RoC as either known or reasonably anticipated carcinogens. An NTP report analyzed the toxicology and carcinogenicity of THF.[203] Results indicated that, based on laboratory tests, THF may have some carcinogenic affect on mice and rats.[204] Importantly, however, NTP does not list THF as either a known or even a reasonably anticipated human carcinogen.[205]

Moreover, California's Proposition 65 - the Safe Drinking Water and Toxic Enforcement

[200] *See, e.g.,* 1998 Final EIR at 160.

[201] *See* http://ntp.niehs.nih.gov/index.cfm?objectid=72016262-BDB7-CEBA-FA60E922B18C2540, (last accessed Nov. 3, 2006).

[202] *Report on Carcinogens*, 11th Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program.

[203] NTP website, http://ntp.niehs.nih.gov/ntpweb/index.cfm?objectid=070A9D22-E84D-DE39-30BD9F0AA6E1794C (last accessed Nov. 3, 2006).

[204] *Ibid*.

[205] MSDS for THF, http://www.jtbaker.com/msds/englishhtml/t1222.htm (last accessed Nov. 3, 2006).

Act - includes a requirement that the Governor of California publish a list of chemicals known to the State to cause cancer or reproductive toxicity.[206] THF is not listed as a known carcinogen on the Proposition 65 list.[207]

The potential carcinogenic nature of the solvents found in CPVC Adhesives was thoroughly reviewed in the 1998 EIR, which was relied on by the 2000 MND. There, Dr. Peter Kurtz determined that "existing data do not support a conclusion that the chemicals present a human cancer risk."[208] Dr. Hinderer found that "current data does not indicate that THF poses any imminent health concerns based on the NTP results."[209]

As stated above, the 1998 EIR is part of the record that supports the 2000 MND, and it is appropriate to rely on the 1998 EIR and its supporting documents in determining whether the currently Proposed Project would have any new or additional impacts. These prior evaluations were part of the basis for the Lead Agency's determinations in the 2000 MND, located at page 1 of the Explanation of Checklist Judgments, where the Lead Agency stated "The determinations made for this Environmental Checklist are based on information in the record for this project as well as information in the record of previous HCD examinations of CPVC for use in residential buildings." Many of the specific topical entries in that Environmental Checklist repeat this statement, and recite environmental impact conclusions that are substantially similar to the conclusions in the 1998 EIR.

As discussed above, worker exposure to solvents present in CPVC Adhesives can be minimized or eliminated altogether by following proper procedures and safety protocols. Application of Adhesives using daubers, wearing protective gloves and replacing the protective gloves immediately upon contamination as required by Section 301.0.2.2, Appendix I, Installation Standards, California Plumbing Code, and ensuring proper ventilation as required by Section 301.0.2.1, will eliminate or minimize exposure risks.

In conclusion, current data does not indicate that THF is a human carcinogen and there is no information in the record indicating that other solvents present in CPVC Adhesives are human carcinogens. Therefore, worker safety impacts of the Project related to carcinogenic effects from Adhesives are less than significant.

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[206] California Health and Safety Code, Section 25249.8.

[207] *See* http://www.oehha.ca.gov/prop65/prop65_list/files/P65single092906.pdf (last accessed Nov. 6, 2006).

[208] 1998 Final EIR at 160.

[209] Dr. Hinderer, Ph.D., Director Health, Toxicology & Product Safety, BFGoodich Performance Materials, letter dated Oct. 23, 1998, at p. 3; 1998 Final EIR at 161.

Impact 4.4-4: Enforcement of California Plumbing Code Regulations and Mitigation Measures

Comments dating back to the comment period for the 1998 Draft EIR have suggested that worker safety mitigation measures similar or identical to those currently included in Section 301.0, Appendix I, Installation Standards, California Plumbing Code, would not be, or are not being, properly followed or enforced.[210] Thus, this is not a new issue related to the Project but an issue identified and analyzed as part of the record supporting the adoption of the 2000 MND.

Existing law and regulations require that employers provide the safety equipment recommended in label directions and safe use instruction on the Material Safety Data Sheet. Compliance with label directions and safe use instruction is enforced by Cal/OSHA, and a failure to comply exposes employers to penalties and civil liability.

The Cal/OSHA enforcement unit has jurisdiction over every employment and place of employment in California to enforce and administer all occupational safety and health standards and regulations.[211] The Cal/OSHA enforcement unit conducts inspections of California workplaces in response to a report of an industrial accident, a complaint about an occupational safety and health hazard, or as part of an inspection program targeting industries which have a high rate of occupational hazards, fatalities, injuries or illnesses.[212] A worker may file a complaint at one of twenty-two Enforcement Unit district offices.[213]

Cal/OSHA may issue a citation or penalty if an investigation shows an employer has violated a health and safety standard or order.[214] Each citation specifies a date by which the violation must be abated.[215] Citations carry penalties of up to $7,000 for each regulatory or general violation and up to $25,000 for each serious violation. Additional penalties of up to $7,000 per day for regulatory or general violations and up to $15,000 per day for serious violations may be proposed for each failure to correct a violation by

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[210] *See, e.g.,* Bellows, J., letter commenting on 1998 Draft EIR, Sept. 8, 2006, section 2; 1998 Final EIR at 189.

[211] Cal/OSHA Enforcement website, http://www.dir.ca.gov/dosh/EnforcementPage.htm (last accessed Oct. 31, 2006).

[212] *Ibid*.

[213] Cal/OSHA Enforcement Unit District Offices, http://www.dir.ca.gov/dosh/DistrictOffices.htm (last accessed Oct. 31, 2006).

[214] Cal/OSHA enforcement provisions, http://www.dir.ca.gov/title8/ch3_2sb2a10.html (last accessed Oct. 31, 2006).

[215] Cal/OSHA, *Safety and Health Protection on the Job* (Feb. 2006), available at http://www.dir.ca.gov/DOSH/PubOrder.asp.

the abatement date shown on the citation. A penalty of not less than $5,000 nor more than $70,000 may be assessed an employer who willfully violates any occupational safety and health standard or order. The maximum civil penalty that can be assessed for each repeat violation is $70,000. A willful violation that causes death or permanent impairment of the body of any employee results, upon conviction, in a fine of not more than $250,000, or imprisonment up to three years, or both and if the employer is a corporation or limited liability company the fine may not exceed $1.5 million.[216]

Based on the enforcement powers of Cal/OSHA, as well as the enforcement power of local governments, it is reasonable to assume that employers will meet their legal obligations to follow safety procedures and regulations by providing necessary safety equipment, training, and oversight.[217] Failure to do so exposes employers to citations, fines and other liabilities.

Furthermore, safety procedures for installation of copper pipe and CPVC pipe are very similar and there is no reason to assume that safety procedures are less likely to be followed for CPVC pipe installation than copper pipe installation. Thus, the risks confronted by workers from improper installation of CPVC pipe are no greater, and possibly less, than from the improper installation of copper pipe.[218]

Therefore, because of governmental enforcement power and employers' obligations to follow the law, worker safety impacts of the Proposed Project related to failure to enforce existing worker safety mitigation measures are less than significant.

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[216] *Ibid.*

[217] *See* 1998 Final EIR at 188-89.

[218] Expert Report of Robert G. Tardiff, Ph.D, at p. 22; Forest, W., Appendix E of the 1998 Final EIR, DHS toxicologist, letter regarding impacts of CPVC pipe compared to copper pipe.

4.5 Solid Waste

If use of CPVC as a potable water piping material increases as a result of the Project approval, this would eventually result in an increased volume of CPVC debris requiring disposal. CPVC debris would be generated when residential buildings using CPVC pipe for potable water piping are demolished, when scraps of CPVC are cast off during installation, and in some instances when CPVC pipe is replaced.

4.5.1 Environmental Setting

The current market share of CPVC and other residential plumbing materials establish the context for the existing environmental setting related to solid waste, or the baseline against which potential solid waste impacts of the proposed Project are to be compared. As explained in Section 3.5.2 of this Recirculated Draft EIR, the estimated current market share of CPVC pipe in California (subject to the Findings Requirement) is 13%, with copper pipe making up an estimated 53.5% of existing water pipe use and 33.5% attributed to all other materials. This section first discusses the current use of copper for residential plumbing systems at this percentage of market share, and then discusses the current use of CPVC at this percentage of market share.

4.5.1.1 Current Copper Use

Based on consultation with some pipe replacement companies, the Lead Agency understands that during most replacement jobs, the existing pipe is left in the structure and not disposed in landfills. Thus, the Lead Agency has determined that current copper and galvanized pipe replacement in residential structures results in little or no recycling of the copper or galvanized pipe and little disposal of these materials in landfills. Copper is considerably more expensive than CPVC, and therefore there is a stronger financial incentive to recycle copper; however, it appears that currently the cost of removing existing pipe during replacement jobs exceeds the potential return from removing the copper pipe and recycling it.

Even though copper is highly recyclable, the use of copper in situations where It is likely to fail due to corrosion in a time period substantially less than the lifetime of a residential buildings is an inefficient use of a non-renewable (although eminently recyclable) resource. When a home must be re-piped because of a failure of copper pipe, there may be property damage and damaged building materials requiring disposal. Wet carpet, sheet rock, and water-damaged personal property consume space in landfills, even though the pipe that is replaced is more likely to be recycled than to be disposed of in landfills.

4.5.1.2 Current CPVC Use

In California, plastics represent 9.5 percent by weight and about 18 percent by volume of the waste placed in landfills: an estimated 3.4 million tons in 2000. Plastics are the fifth-largest category of material by total weight and the second-largest category of waste by volume in California landfills.[219]

Plastics are divided into several categories. CPVC pipe is classified as part of the Durable Plastic Items (DPIs) group, not as construction debris as one might expect. Other examples of DPIs include mop buckets, plastic outdoor furniture, plastic toys, CD's, plastic stay straps, sporting goods, and plastic house wares such as dishes, cups, and cutlery. This category also includes building materials such as house siding, window sashes and frames, housings for electronics (such as computers, televisions and stereos), fan blades, impact-resistance cases (for example, tool boxes, first aid boxes, tackle boxes, sewing kits, etc.), and other types of plastic pipes and fittings.[220] Overall, DPIs account for about 20 percent by weight of the total plastics disposed of in California landfills.[221] The proportion of DPIs which are CPVC pipe products has not been calculated. However, based on the extensive use and disposal of such items as plastic toys and plastic house wares, CPVC pipe products probably make up a very small portion of the total amount of DPIs that are disposed in California.

Most plastics and plastic products are not recycled. Plastic bottles constitute the biggest source of plastic products that are recycled. Overall, the rate of sales of plastic products far exceeds the rate of recycling for such products. This is not surprising given that plastics are uneconomical to recycle. Average collection and processing costs often exceed scrap values by more than two and one half times.[222] Notably, aluminum is the only material that has a higher recycling rate than the amount disposed.[223]

Additionally, assuming that the common construction industry practice for existing pipe to be left in the structure when it is replaced with new pipe were to continue, it would

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[219] Plastics White Paper, Optimizing Plastics Use, Recycling, and Disposal in California, Integrated Waste Management Board, page 7-8, May 2003. The 9.5% data originated from the Statewide Characterization Study, produced under contract by the Cascadia Consulting Group Inc for the Integrated Waste Management Board, December 2004. This 2004 study did not contain data based on volume.

[220] Statewide Characterization Study produced under contract by Cascadia Consulting Group Inc for the Integrated Waste Management Board, December 2004, page 101. (Doc.180)

[221] Plastics White Paper, Optimizing Plastics Use, Recycling, and Disposal in California, May 2003, Integrated Waste Management Board. (Doc.178)

[222] Plastics White Paper, Optimizing Plastics Use, Recycling, and Disposal in California, May 2003, Integrated Waste Management Board. (Doc.178)

[223] Plastics White Paper, Optimizing Plastics Use, Recycling, and Disposal in California, May 2003, Integrated Waste Management Board. (Doc.178)

mean that the majority of CPVC pipe would not impact landfill capacities for quite some time after installation, since most housing units continue in existence for well over 30 years (the typical "mortgage life" of residential properties). However, eventually, many structures likely will be demolished and the CPVC would need to be disposed of properly. Any disposal challenges, however, must be balanced against the benefits derived from the long, productive life of CPVC pipes.

4.5.2 Regulatory Setting

The California Integrated Waste Management Board (IWMB) is the state agency designated to oversee, manage, and track the 76 million tons of waste generated each year in California. IWMB promotes a sustainable environment. In addition to many innovative programs and incentives, IWMB promotes the use of new technologies for the practice of diverting California's resources away from landfills.

There are four major existing environmental laws that relate to plastics: 1) the California Integrated Waste Management Act (Pub. Resources Code, §40000 et seq.); 2) the Rigid Plastic Packaging Container Act (Pub. Resources Code §42300 et seq.); 3) the "Plastics Trash Bag Law" (Chapter 1096, Statutes of 1993, Hart, SB 951); and 4) the California Beverage Container Recycling and Litter Reduction Act of 1986 ("Bottle Bill" or "AB 2020"). None of these laws govern plastic pipe products in general, or CPVC in particular.

4.5.3 Thresholds of Significance

According to CEQA Guidelines Appendix G, a proposed project would result in significant adverse impacts related to water quality if it would not:

1. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs; or
2. Comply with federal, state, and local statutes and regulations related to solid waste.

4.5.4 Impacts and Mitigation Measures

<u>Impact 4.3-1</u>: Landfill Capacity

The Lead Agency recognizes that California has a problem with all plastic recycling. While there has been a concerted effort to encourage plastic bottle recycling, the same is not true for other plastic items. A shift in California policy is necessary to truly address the issues of plastics disposal and recycling.

There is no reason to suspect that CPVC solid waste impacts will be any better or worse than other non-bottle plastics. CPVC pipe has a long lifetime, unlike plastic water bottles that are generally used once, in possibly as little as five minutes, and then thrown away. CPVC pipe for potable water piping in residential buildings will not appear in the demolition debris waste stream in significant quantities until buildings employing CPVC pipe are demolished at the end of their useful lives, which likely will be well over 30 years (the typical "mortgage life" of residential properties).

In general, plastics recycling is increasing and is expected to further increase in the future. There is recycling of other plastics, including PVC, the parent polymer for CPVC. The recycling of CPVC and PVC is based on the same basic technologies (sorting, reuse, and reforming). If CPVC pipe is used more extensively in the future in California, it is likely that it too will be recycled. However, CPVC will likely remain considerably less valuable than copper, and thus there will not be as strong a financial incentive to recycle CPVC as there will be to recycle copper. However, CPVC pipe can be recycled into items such as mobile home skirting, picnic tables, fence posts, and numerous other products. It can also be reused rather than recycled, as is the case now with PVC pipe reclamation in California.

On average, 7,359 housing units are demolished in California every year. The highest percentage of this occurs in Los Angeles County where approximately 2,531 housing units are demolished each year.[224] While it would not be reasonable to assume that every demolished housing unit would contain CPVC plumbing, it is likely that some CPVC pipe will need to be disposed of each year. There is no way of predicting the exact amount or location of this disposal. CPVC-plumbed units probably would not make up a significant portion of the demolished housing units until those structures reach an advanced age. Of course, natural disasters, major building projects, and other factors could result in fairly new housing units being demolished, but estimating where and when this would occur and what percentage of those units would contain CPVC would be mere speculation.

The Lead Agency has reviewed available information from the California Integrated Waste Management Board (IWMB), and has found no evidence indicating that there would be a lack of sufficient permitted landfill capacity to accommodate the project's solid waste disposal needs. The IWMB was recently honored by the U.S. EPA for setting and reaching a goal or diverting over 50 percent of statewide solid waste from landfill disposal.[225] This waste reduction effort leads the nation.[226] Given ongoing

[224] Data supplied by the Department of Housing and Community Development's Housing Policy Development Division. See Appendix A, Table 28.

[225] Integrated Waste Management Board press release: *California Receives Honors from US EPA:*

statewide efforts to increase reuse and recycling of solid waste materials, it is reasonable to assume that CPVC will be more likely to be reused and recycled if it enters the waste stream in greater quantities.

In addition, a Landfill Facility Compliance Study completed by the IWMB in 2004 evaluating the performance of landfills did not mention the existence of capacity or other solid waste problems related to CPVC, which is already in use for residential potable water systems pursuant to the Findings Requirement, among other existing uses.[227] That study consisted of two phases: (I) a comprehensive, cross-media inventory and assessment of the environmental performance of municipal solid waste landfills for the time period from 1998 through 2001; and (II) an assessment of the effectiveness of current regulatory requirements for control of environmental impacts over time and identification of possible ways to improve regulations to provide for greater environmental protection.[228] A word search of the study did not reveal any discussion of CPVC.

Based on all of the information in the record[229], the Lead Agency concludes that the current lack of CPVC recycling in California is due to a lack of appreciable quantities of CPVC in the waste stream. There is recycling and reuse of another similar, but lower value plastic (i.e., PVC) in California now. If more appreciable quantities of CPVC pipe are used in residential housing in California in the future, it is likely that at least some of it will be recycled or reused when that housing is ultimately demolished. However, the percentage of CPVC recycled will probably never approach the recycling of copper due, in part, to the large difference in value of the two materials.

In summary, the Project may result in disposal of CPVC pipe in landfills to a minor degree during CPVC pipe installation (due to the discarding of scraps). A somewhat greater degree of disposal may occur when the CPVC pipe is replaced, although during most replacement jobs the existing pipe is left in place and not disposed in landfills. Most disposal of CPVC pipe in landfills would occur when residential structures plumbed with CPVC are demolished. Beyond pure speculation, there is no way to tell exactly when or where CPVC pipe will be disposed, what the capacity of various existing and future landfills throughout the State will be at the time of disposal, exactly to

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Golden State Leads the Nation in Reducing Waste (Oct. 19, 2006), available at http://www.ciwmb.ca.gov/PressRoom/2006/October/39.htm (last accessed Nov. 6, 2006).

[226] *Ibid.*

[227] Cal. Integrated Waste Management Bd., *Contractor's Report to the Board: Landfill Facility Compliance Study Task 8 Report – Summary of Findings and Comprehensive Recommendations* (Aug. 2004).

[228] *Ibid.*

[229] *See, e.g.,* 1998 Final EIR at 75.

what extent it will be recycled or, or what the plastic disposal laws will be at that time. However, the durability and protracted life of CPVC is likely to reduce both the necessity for replacement and any corresponding production of waste, reducing the quantities of debris such as wet carpet, sheet rock, and water-damaged personal property discarded as a result of leaking copper pipes. Additionally, the Lead Agency considers that recycling and reuse of CPVC pipe is both technically feasible and, given current trends in plastic recycling, is likely to become much more prevalent by the time residential structures plumbed with CPVC pipe are demolished. Thus, the Project will result in less than significant impacts related to landfill capacity.

Impact 4.5-2: Compliance with Statutes and Regulations

The Project will not violate or cause noncompliance with any federal, state, or local statutes or regulations related to solid waste. CPVC is currently used in California, subject to the Findings Requirement, and the Lead Agency is not aware of any noncompliance with solid waste regulations. Currently, there are no solid waste regulations limiting the use of CPVC. In addition, a Landfill Facility Compliance Study completed by the IWMB in 2004 did not indicate the existence of any noncompliance with solid waste regulations related to CPVC, which is already in use for residential potable water systems pursuant to the Findings Requirement, among other existing uses.[230] That study consisted of two phases: (I) a comprehensive, cross-media inventory and assessment of the environmental performance of municipal solid waste landfills for the time period from 1998 through 2001; and (II) an assessment of the effectiveness of current regulatory requirements for control of environmental impacts over time and identification of possible ways to improve regulations to provide for greater environmental protection.[231] A word search of the study did not reveal any discussion of CPVC. Based upon this, the Project will not result in any significant impacts related to failure to comply with federal, state, or local statutes or regulations related to solid waste.

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[230] Cal. Integrated Waste Management Bd., *Contractor's Report to the Board: Landfill Facility Compliance Study Task 8 Report – Summary of Findings and Comprehensive Recommendations* (Aug. 2004).

[231] *Ibid.*

CHAPTER 5.0
ALTERNATIVES

5.1 Introduction

This chapter reviews the range of alternatives to the Project considered in this Recirculated Draft EIR. The purpose of the analysis of alternatives in an EIR is to describe a range of reasonable alternatives to the proposed project that could feasibly attain most of the objectives of the project while reducing the environmental impacts of the project, and to evaluate the comparative merits of the alternatives (CEQA Guidelines, Section 15126.6(a)).

Additionally, Section 15126.6(b) of the CEQA Guidelines requires consideration of alternatives that could substantially lessen or eliminate any significant adverse environmental effects of the proposed project, including alternatives that may be more costly or could otherwise impede the proposed project's objectives to some degree. The range of alternatives evaluated in an EIR is governed by a "rule of reason," which requires the evaluation of alternatives "necessary to permit a reasoned choice." (CEQA Guidelines Section 15126.6(f)). Alternatives considered must include those that offer substantial environmental advantages over the proposed project and may be feasibly accomplished in a successful manner considering economic, environmental, social, technological, and legal factors.

In identifying the range of alternatives to be evaluated, the Lead Agency reassessed a number of potential alternatives to the Project. Several alternatives were initially identified but were not considered in detail in the RDEIR because they did not achieve the basic objectives of the Project. These alternatives, and the reasons why they were not selected for detailed consideration, are discussed in Section 5.2 below.

Three alternatives are evaluated in Section 5.3. These alternatives include an alternative that would require the use of low-VOC cements and primers, an alternative that would require the use of low-VOC, one-step cements, and the No Project Alternative. As required by Section 15126.6(e) of the CEQA Guidelines, the No Project Alternative must be evaluated as part of the EIR. The purpose in evaluating the No Project Alternative is to allow decision makers the ability to compare the impacts of the proposed project versus no project. According to the CEQA Guidelines, the No Project Alternative shall discuss what would reasonably be expected to occur in the foreseeable future if the proposed project were not approved. (CEQA Guidelines Section 15126.6(e)(2)).

As explained in Chapter 3.0 of this RDEIR, the description of the Project has been revised since the July 2006 Draft EIR was circulated, so that the Project matches the petition that was originally submitted to the Lead Agency. A requirement for low-VOC adhesives no longer is considered to be part of the Project. However, the Low-VOC Adhesives Alternative analyzed in this chapter is identical to the Project that was described in the July 2006 Draft EIR.

5.2 Alternatives INITIALLY Considered but not evaluated in detail

5.2.1 Do Not Remove the Findings Requirement and Require Low Emission Adhesives

Under this alternative, the Lead Agency would recommend that the California Building Standards Commission re-adopt the current CPVC-related regulations while keeping the Findings Requirement in place. Low-VOC CPVC adhesives would be required. This alternative was originally included in the July 2006 Draft EIR as a feasible alternative; however, it is not analyzed in detail in this Recirculated Draft EIR because it does not attain the most basic objectives of the Project. The project objective set forth in Section 3.4 of this RDEIR is reproduced below:

The current Uniform Plumbing Code permits the unrestricted use of CPVC pipe for hot and cold water distribution within residential buildings. The current California Plumbing Code conditions the use of CPVC to those situations where the local building official makes a finding that there is or will be a premature failure of metallic pipe due to existing water or soil conditions (referred to as the “Findings Requirement”). The project objective is to remove the “Findings Requirement” from the California Plumbing Code thereby allowing unconditional use of CPVC throughout California as an alternative pipe material for residential potable water plumbing systems.

Section 15126.6(a) of the CEQA Guidelines states that an “EIR shall describe a range of reasonable alternatives to the project … which would feasibly attain most of the basic objectives of the project.” In this case, the alternative would not attain the project objective because the Findings Requirement would remain in place. Consequently, this alternative is not evaluated in detail in this EIR.

5.2.2 Approval of Other Materials

There are materials (other than CPVC), which may be suitable for potable water use and that are not prone to corrosion under certain specified conditions. It is not the intention of the Lead Agency to prevent the use of (or in any way pre-judge) either existing materials or newly developed materials for potable water piping. This Recirculated Draft EIR does not consider other corrosion-resistant materials because the basic objective of this Project is to remove the Findings Requirement, thus making CPVC more easily available for potable water plumbing in residences throughout the state.

5.2.3 Copper Piping

While CEQA requires analysis of alternatives, in this case copper pipe is not an alternative to the Project under consideration. The Lead Agency is not approving either copper *or* CPVC, but instead is assessing the potential impacts of authorizing CPVC use without the Findings Requirement *in addition to the plumbing systems already approved and in use.* The existing installations of copper plumbing systems would remain in place, with some proportion of new construction and remodeling projects utilizing CPVC plumbing systems. The existing copper systems are more properly considered as an element of the environmental setting, and the current extent of the use of copper pipe is analyzed as part of the No Project Alternative.

5.3 Alternatives Evaluated in this EIR

5.3.1 Alternative A – No Project Alternative

Description

Under this alternative, the Lead Agency would not recommend that the California Building Standards Commission delete the Findings Requirement. The Lead Agency would not make any other recommendation regarding the use of CPVC, and the adopted regulations regarding CPVC use would remain unchanged. This does not mean that CPVC would not be used in California. As noted earlier, CPVC is currently approved for potable water use in residential plumbing systems subject to the Findings Requirement. Local jurisdictions would still be able to approve CPVC pipe for potable water piping in residential buildings based on local findings that there is or will be premature failure of metallic pipe due to existing water or soil conditions.

Impact Analysis

Air Quality

The No Project Alternative would not result in increased air quality impacts beyond that described in the current setting. It is assumed that the current percentage of use of CPVC piping in California (vs. other piping) (13 percent) and the current percentage of use of copper piping (53.5 percent) would remain constant. The Findings Requirement would continue to apply to the use of CPVC piping for residential potable water systems throughout the State.

The only identified air quality impacts associated with the Project are the increase in

VOC emissions, which would result in increased ambient ozone concentrations. The No Project Alternative would eliminate this increase in the amount of VOC emissions. The Project is anticipated to increase the market share of CPVC by 19 percent to a total of 32 percent of the California market for residential plumbing systems. Under the No Project alternative, VOC emissions from CPVC adhesives would remain in place at current levels, i.e., with 13 percent of the residential potable water pipe market using CPVC. To determine these current levels, the same methodology for calculating VOC emissions of the Project was repeated with a revised CPVC market share of 13 percent. Results of this analysis are set forth in Tables 5.3.1.1 through 5.3.1.11.

Since the market share of CPVC in the installation of residential plumbing systems in California would remain at 13 percent and would not increase by 19 percent to a total of 32 percent under the No Project Alternative, the market share of copper pipe also would not correspondingly decrease under this alternative. Therefore, air quality impacts related to the use of copper would not decrease under the No Project Alternative.

During soldering, toxic and carcinogenic smokes and vapors are produced and released into the atmosphere.[232] A recent study measured organic vapors generated during soldering of copper pipes when using "water soluble flux" and "water soluble tinning flux."[233] The tests were conducted according to procedures found in the American Industrial Hygiene Association Journal, July 1990 article "Identification of Organic Vapors from Commercially Available Soldering Fluxes during Simulated Soldering of Copper Plumbing Systems."[234] The full results of the study are presented in Appendix D and summarized in Table 4.4-1, located in Section 4.4 of this RDEIR.

This study demonstrated that numerous toxic organic vapors are generated during the copper pipe soldering process, including the following chemicals that are present on the California Air Resource Board's Toxic Air Contaminant Identification List[235]: chlormethane; vinyl chloride; chloromethane; carbon disulfide; isopropyl alcohol; methylene chloride; hexane; vinyl acetate; 2-butanone; benzene; 1,2 dichlorethane; trichloroethylene; 1,4-dioxane; toluene; 4-methyl-2-pentanone (MIBK); tetrachlorethylene; ethyl benzene; chlorobenzene; m/p-xylene; o-xylene; styrene; and benzyl chloride. These vapors are released into the atmosphere and can contribute to

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[232] Nikora, J., Olson, A., & Steele, W., *Identification of Organic Vapors from Commercially Available Soldering Fluxes During Simulated Soldering of Copper Plumbing Systems*, American Industrial Hygiene Ass'n Journal, Vol. 51, No. 7, pp. 476-77 (July 1990).

[233] Research Triangle Park Laboratories, Inc., Flux Tests; PO Number: PD 01-03735, (Sept. 26-27 2006).

[234] Research Triangle Park Laboratories, Inc., at p. 1.

[235] CARB, California Air Resources Board, Toxic Air Contaminant (TAC) Identification List, Category IIa substances (Dec. 1999), available at http://www.arb.ca.gov/toxics/cattable.htm#Note%201 (last accessed Nov. 2, 2006).

air quality impacts. While the amount of these chemicals emitted during the copper pipe soldering process cannot be quantified from this study, it provides a qualitative view of potential air quality emissions from copper pipe installation. Furthermore, the study identified particles less than 10 microns in size that were emitted into the air but not accounted for in the tests.[236] As has been shown, particulates below 10 microns in diameter have a greater chance to enter the respiratory system, and particles below 5 microns in diameter are more apt to reach the deep lung or alveolar spaces.[237] In healthy lungs, particles from 5 to 10 microns in diameter are generally removed from the respiratory system by a constant cleansing action that takes place in the upper respiratory tract. However, with excessive "dust" exposures or a diseased respiratory system, the efficiency of the cleansing action can be significantly reduced.[238] The emissions of these chemicals and particulates would not be reduced under the No Project Alternative, but would be reduced by the Project.

Water Quality

The No Project Alternative would not result in increased water quality impacts beyond that described in the current setting. It is assumed that the current percentage of use of CPVC piping (vs. other piping) in California (13 percent) and the current percentage of use of copper piping (53.5 percent) would remain constant. The Findings Requirement and the flushing mitigation measure identified in Section 301.0 of Appendix I Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distribution Systems (California Plumbing Code) would continue to apply to the use of CPVC piping for residential potable water systems throughout the State.[239] The flushing mitigation measure would apply to all use of CPVC for residential plumbing systems under both the Project and the No Project Alternative.

As explained in Section 4.3.1 of this Recirculated Draft EIR, there are existing water quality impacts from the current use of copper piping. These impacts would continue at current levels if the No Project Alternative were selected, but would be reduced if the Project were selected. These impacts that would not be reduced under the No Project Alternative include impacts associated with toxicity from leaching of copper pipe, which can result in gastrointestinal illness after short-term exposure to contaminated drinking

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[236] Research Triangle Park Laboratories, Inc., at p. 1.

[237] MSA, *Key Elements of a Sound Respiratory Protection Program*, at p. 3 (Apr. 2004), available at http://media.msanet.com/NA/USA/APR/ConventionallyMaintainedRespirators/ComfoClassicHalfMaskRespirators/1000-61KeyElementsResp.pdf.

[238] MSA, *Key Elements of a Sound Respiratory Protection Program*, at pp. 3-4.

[239] The California Plumbing Code section containing this flushing mitigation would be renumbered as Section 1.2.1 of Appendix I Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, as part of the proposed Project. However, no substantive changes to the measure are proposed.

water and liver or kidney damage after long-term exposure; leaching of lead and other chemicals from the use of solder, flux, and cutting fluids; and environmental contamination of water bodies due to copper corrosion with associated adverse impacts on aquatic water systems.

Thus, the Project, by providing Californians with the option to use CPVC as an alternative plumbing material without the Findings Requirement, would result in less contamination of drinking water and water bodies into which wastewater treatment plants discharge, especially in areas with conditions of low pH or other aggressive (corrosive) water.

Worker Safety

The No Project Alternative would not result in increased worker safety impacts beyond that described in the current setting. It is assumed that the current percentage of use of CPVC piping (vs. other piping) in California (13 percent) and the current percentage of use of copper piping (53.5 percent) would remain constant. The Findings Requirement and the worker safety measures identified in Section 301.0 of Appendix I Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distribution Systems (California Plumbing Code) would continue to apply to the use of CPVC piping in residential development.[240] These measures include mechanical ventilation, use of non-latex gloves, and the Lead Agency's periodic monitoring of the local implementation of mitigation measures required for CPVC use. Those measures would apply to all use of CPVC for residential plumbing systems under both the Project and the No Project Alternative.

However, unlike the Project, the No Project Alternative also would not reduce the existing worker safety impacts resulting from the current market share of copper for potable water piping use. A number of risks to worker health and safety are present during the installation of copper pipe for potable water use. The application of flux may cause worker safety impacts because of the flux's corrosive nature, potentially harmful fumes,[241] and potential for causing dermal exposure.[242] The heating of pipe during the soldering process also potentially exposes workers to harmful inhalation of tin, antimony, and/or lead fumes.[243] Lead in solders poses unique health risks to workers.

[240] The California Plumbing Code section containing these worker safety measures would be renumbered as Section 1.2.2 of Appendix I Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, as part of the proposed Project. However, no substantive changes to the measures are proposed.

[241] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.

[242] Expert Report of Robert G. Tardiff, Ph.D, at pp. 12-13.

[243] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.

Materials in the low-lead solders can cause skin, eye and lung hazards, possibly resulting in respiratory irritation, fevers, chills, muscular pain, vomiting, and sweating from inhalation of fumes.[244]

Moreover, a recent study measured organic vapors generated during soldering of copper pipes when using "water soluble flux" and "water soluble tinning flux."[245] The full results of the study are presented in Appendix D and summarized in Table 4.4-1, located in Section 4.4 of this RDEIR. The study demonstrated that numerous toxic organic vapors are generated during the copper pipe soldering process, including contaminants present on the California Air Resource Board's Toxic Air Contaminant Identification List.[246] While the amount of these chemicals emitted during the copper pipe soldering process cannot be quantified from this study, it does provide a qualitative view of potential inhalation hazards to copper pipe installers.

Furthermore, the study identified particles less than 10 microns in size that were emitted into the air but not accounted for in the tests.[247] As has been shown, particulates below 10 microns in diameter have a greater chance to enter the respiratory system, and particles below 5 microns in diameter are more apt to reach the deep lung or alveolar spaces.[248] For workers with healthy lungs, particles from 5 to 10 microns in diameter are generally removed from the respiratory system by a constant cleansing action that takes place in the upper respiratory tract. However, with excessive "dust" exposures or a diseased respiratory system, the efficiency of the cleansing action can be significantly reduced.[249]

In addition to the foregoing, the installation and repair of copper pipe has other inherent hazards.[250] Hot materials, pipe, fittings, molten solder, flux and the heat source can cause serious thermal burns. The heat source can also start fires, potentially creating immediate safety hazards to workers, residents and firefighters. Incisions, cuts and

[244] 1998 Final EIR at 119-21.

[245] Research Triangle Park Laboratories, Inc., Flux Tests; PO Number: PD 01-03735, (Sept. 26-27 2006).

[246] CARB, California Air Resources Board, Toxic Air Contaminant (TAC) Identification List, Category IIa substances (Dec. 1999), available at http://www.arb.ca.gov/toxics/cattable.htm#Note%201 (last accessed Nov. 2, 2006).

[247] Research Triangle Park Laboratories, Inc., at p. 1.

[248] MSA, *Key Elements of a Sound Respiratory Protection Program*, at p. 3 (Apr. 2004), available at http://media.msanet.com/NA/USA/APR/ConventionallyMaintainedRespirators/ComfoClassicHalfMaskRespirators/1000-61KeyElementsResp.pdf.

[249] MSA, *Key Elements of a Sound Respiratory Protection Program*, at pp. 3-4.

[250] *See, e.g.,* Kinn, S., Khuder, S., Bisesi, M., & Wooley, S., *Evaluation of Safety Orientation and Training Programs for Reducing Injuries in the Plumbing and Pipefitting Industry*, Journal of Occupational and Environmental Medicine, 2000, p. 1142.

abrasions result from cutting and de-burring pipe. Copper pipe also poses a risk of electrocution because it is an excellent conductor of electricity. Pressure testing of the piping system also presents a rare but dangerous risk where piping failure results in pieces of failed pipe being propelled outward. Such events can pose risk of very serious injury to anyone struck by the propelled pipe.[251]

Health risks associated with copper pipe installation would not be expected to occur in installers who adhered to recommended installation practices, including but not necessarily limited to, the use of adequate ventilation or wearing of a half-face mask with fume filters, gloves, and goggles as needed.[252] However, the *improper* installation of copper pipe (i.e., without following proper safety procedures) has the potential to present risks to worker health and safety, as discussed above. As such the risks associated with improper installation of copper pipe under the No Project Alternative are no less than, and possibly exceed, the risks associated with improper CPVC installation associated with the Project.[253]

Solid Waste

The No Project Alternative would not result in increased solid waste impacts beyond that described in the current setting. It is assumed that the current percentage of use of CPVC piping (vs. other piping) in California (13 percent) and the current percentage of use of copper piping (53.5 percent) would remain constant.

The Lead Agency has determined that current copper and galvanized pipe replacement in residential structures results in little or no recycling of the copper or galvanized pipe and little disposal in landfills of this material. It is a common industry practice for existing pipe to be left in the structure, rather than disposed of in landfills, during pipe replacement jobs. Copper is very recyclable, and recycled copper is more valuable than recycled CPVC, and therefore there is more incentive and likelihood for copper to be recycled in the case of re-pipings where existing pipe is not left in the structure or when existing structures are demolished.

On the other hand, even though copper is very recyclable, the use of copper in areas where it is likely to fail due to corrosion within a time period that is substantially less than the lifetime of a residential building is an inefficient use of a non-renewable (although recyclable) resource. Moreover, when a home must be re-piped because of a failure of copper pipe, there often will be property damage and damaged building

[251] Expert Report of Robert G. Tardiff, Ph.D, at p. 8.
[252] Expert Report of Robert G. Tardiff, Ph.D, at p. 21.
[253] Expert Report of Robert G. Tardiff, Ph.D, at p. 22; Appendix E of the 1998 Final EIR, DHS toxicologist, letter regarding impacts of CPVC pipe compared to copper pipe.

materials requiring disposal. Wet carpet, sheet rock, and water-damaged personal property also consume space in landfills, even if the pipe that is replaced is recycled. Finally, it is important to note that the Lead Agency has determined in section 4.5 of this EIR that the Project would result in less than significant impacts related to solid waste. Therefore, while the No Project Alternative potentially would have reduced impacts in comparison to the Project, any such reduction is not anticipated to be significant.

5.3.2 Alternative B - Delete the Finding Requirements and Use Low-VOC Adhesives Alternative (hereafter referred to as the "Low-VOC Adhesives Alternative")

Description

Under this alternative, the Lead Agency would recommend that the California Building Standards Commission adopt the proposed CPVC-related regulations, which would delete the Findings Requirement, and the Lead Agency would also recommend that the California Building Standards Commission adopt regulations that would require the use of Low-VOC CPVC adhesives for the installation of CPVC residential potable water systems.

Like the Project, this alternative would include the amendment of regulations (i.e., building standards) pertaining to the use of CPVC pipe for potable water piping in buildings under the jurisdiction of the Lead Agency which include: hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including accessory buildings, facilities, and uses thereto; as well as permanent buildings, and permanent accessory buildings or structures, constructed within mobilehome parks and special occupancy parks that are under the control and ownership of the park operator.

The California Building Standards Commission would be responsible for final adoption of these amendments into the California Plumbing Code. The California Building Standards Commission receives proposed codes from a number of public agencies which have statutory authority to propose codes for various types of occupancies. The code provisions related to potable water piping in residential buildings are the responsibility of the Lead Agency.

The modifications to the existing California Plumbing Code under the low-VOC Adhesives Alternative would entail: 1) removing the current requirement that a building official make a finding that there is or will be a premature failure of metallic pipe because of existing water or soil conditions (referred to as the “Findings Requirement”) prior to allowing CPVC to be used for potable water piping in residential structures; and 2) requiring the use of Low-VOC adhesives. Low-VOC adhesives are CPVC cements and primers (if one-step cement is not used) that have a limited amount of volatile organic compounds (VOCs).

Use of CPVC Adhesives will cause volatile organic compounds (VOCs) to be released into the atmosphere. These VOCs can be precursors to ozone. Deleting the Findings Requirement may result in an increase in the number of residential units that are plumbed with CPVC and thus may increase the amount of ozone precursors emitted. This impact would be reduced by the requirement of Low-VOC adhesives, since this requirement would not allow the use of CPVC cements and primers with a VOC content exceeding specified limits.

The California Plumbing Code changes that would be proposed under the Low-VOC Adhesives Alternative are set forth beginning on the following page:

Proposed Code Changes: Alternative B – Low-VOC Adhesives Alternative

CPVC RELATED EXPRESS TERMS FOR PROPOSED BUILDING STANDARDS OF THE DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT REGARDING THE ADOPTION BY REFERENCE OF THE 2006 EDITION OF THE UNIFORM PLUMBING CODE (UPC) WITH PROPOSED AMENDMENTS INTO THE 2007 CALIFORNIA PLUMBING CODE (CPC) CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 5

LEGEND FOR EXPRESS TERMS:
Existing California amendments or code language being modified: All such language appears in *italics*; modified language is underlined or shown in ~~strikeout~~.

New UPC language with new California amendments: UPC language shown in normal Arial 11 point; California amendments to UPC text shown *underlined and in italics*.

3. Repealed text: All such language appears in ~~strikeout.~~

4. Notation: Authority and Reference citations are provided at the end of each chapter.

AMENDMENTS:

CHAPTER 2
DEFINITIONS
Adopt entire Chapter 2 as amended.

215.0
Low-VOC Cement: *Cement with a volatile organic compound (VOC) content of less than or equal to 490 g/L for CPVC Cement, 510 g/L for PVC Cement, and 325 g/L for ABS Cement, as determined by the South Coast Air Quality Management District's* Laboratory Methods of Analysis for Enforcement Samples, *Method 316A.*

Low-VOC Primer: *Primer with a volatile organic compound (VOC) content of less than or equal to 550 g/L, as determined by the South Coast Air Quality Management District's* Laboratory Methods of Analysis for Enforcement Samples, *Method 316A.*

CHAPTER 3
GENERAL REGULATIONS

316.1.6 Solvent Cement Plastic Pipe Joints. Plastic pipe and fittings designed to be joined by solvent cementing shall comply with appropriate IAPMO Installation Standards.

ABS pipe and fittings shall be cleaned and then joined with solvent cement(s). CPVC pipe and fittings shall be cleaned and then joined with listed primer(s) and solvent cement(s).

Exception: Listed solvent cements that do not require the use of primer shall be permitted for use with CPVC pipe and fittings, manufactured in accordance with ASTM D2846, 1/2 inch through 2 inches in diameter.

PVC pipe and fittings shall be cleaned and joined with primer(s) and solvent cement(s). A solvent cement transition joint between ABS and PVC building drain or building sewer shall be made using a listed transition solvent cement.

For applications listed in 108.2.1 through 108.2.1.3 regulated by the Department of Housing and Community Development, plastic pipe and fittings joined with solvent cement shall utilize Low-VOC primer(s)*, if a primer is required, and Low-VOC solvent cement(s) as defined in Section 215.*

~~***316.1.6.1 [For HCD 1 & HCD 2] Solvent Cement Plastic Pipe Joints.*** *Plastic pipe and fittings designed to be joined by solvent cementing shall comply with Section 310.4 of this code and an approved nationally recognized installation standard listed in Table 14-1.*~~

~~*ABS pipe and fittings shall be cleaned and then joined with listed solvent cement(s).*~~

~~*CPVC and PVC pipe and fittings shall be cleaned and joined with listed primer(s) and solvent cement(s).*~~

CHAPTER 6
Water Supply and Distribution

~~***604.1.1 [For HCD 1 & HCD 2]*** *Water distribution pipe, building supply water pipe and fittings shall be of brass, copper, cast iron, galvanized malleable iron, galvanized wrought iron, galvanized steel, or other approved materials. Asbestos-cement, CPVC, PE or PVC, water pipe manufactured to recognized standards may be used for cold water distribution systems outside a building except as provided for CPVC use pursuant to Section 604.1.2. All materials used in the water supply system, except valves and similar devices shall be of a like material, except where other wise approved by the Administrative Authority.*~~

Section 604.1.1~~2~~ ~~[HCD 1]~~ Local Authority to Approve CPVC Pipe Within Residential Buildings Under Specified Conditions

For applications listed in 108.2.1.1 ~~through 108.2.1.3~~ regulated by the Department of Housing and Community Development, ~~T~~ the local responsible building official of any city, county, or city and county, in accordance with the procedures set forth in Chapter 3, ~~(with the exception of Section 301.2.7)~~ ~~may~~ shall authorize by permit the use of

CPVC for hot and cold water distribution systems within the interior of residential buildings provided all of the following conditions are satisfied:

~~***(a) Finding Required.*** *The building official shall first make a determination that there is or will be the premature failure of metallic pipe if installed in such residential buildings due to existing water or soil conditions.*~~

(a)~~(b)~~ Permit Conditions. *Any building permit issued pursuant to ~~this~~ Section 604.1.1 shall be conditioned on compliance with the mitigation measures set forth in this Section.*

(b)~~(c)~~ Approved Materials. *Only CPVC plumbing material listed as an approved material ~~in~~, and installed in accordance with this code may be used.*

(c)~~(d)~~ Installation and Use. *Any installation and use of CPVC plumbing material pursuant to this Section shall comply with all applicable requirements of this code and Section 1.2 of Appendix I of this code, Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distributions Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

(d)~~(e)~~ Certification of Compliance. *Prior to issuing a building permit pursuant to ~~this~~ Section 604.1.1, the building official shall require as part of the permitting process that the contractor, or the appropriate plumbing subcontractors, provide written certification: (1) that is required in subdivision (e)~~(f)~~; and (2) that he or she will comply with the flushing procedures and worker safety measures set forth in Section 1.2 of Appendix I of this code, Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

(e)~~(f)~~ Worker Safety. *Any contractor applying for a building permit that includes the use of CPVC plumbing materials authorized pursuant to this Section shall include in the permit application a signed written certification stating that~~:~~;*
(1) They are aware of the health and safety hazards associated with CPVC plumbing installations.
(2) They have included in their Illness and Injury Prevention Plan the hazards associated with CPVC plumbing pipe installations; and
(3) The worker safety training elements of their Injury and Illness Prevention Plan meet~~s~~ the Department of Industrial Relations' guidelines.

(f)~~(g)~~ Findings of Compliance. *The building official shall not give final permit approval of any CPVC plumbing materials installed pursuant to ~~this~~ Section 604.1.1 unless he or she finds that the material has been installed in compliance with the requirements of this code and that the installer has complied with the requirements in Section ~~301.0.1~~ 1.2.1, of Appendix I of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

(g)~~(h)~~ Penalties. *Any contractor or subcontractor found to have failed to comply with the ventilation, glove or flushing requirements of Section ~~301.0~~ 1.2.2 of Appendix I of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water*

Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005 shall be subject to the penalties in Health and Safety Code, Division 13, Part 1.5, Chapter 6 (Section 17995 et seq.). In addition, if during the conduct of any building inspection the building official finds that the ventilation and glove requirements of Section ~~301.0~~ 1.2.2 of Appendix I of this code, "Special Requirements for CPVC Installation within Residential Buildings", are being violated, such building~~s~~ officials shall cite the contractor or subcontractor for that violation.

APPENDIX I
INSTALLATION STANDARDS

Adopt entire Appendix I as amended.

INSTALLATION STANDARD
FOR
CPVC SOLVENT CEMENTED HOT AND COLD WATER DISTRIBUTION SYSTEMS
IAPMO IS 20-~~2003~~ 2005

~~Section 301.0 Special Requirements for CPVC Installation Within Residential Buildings Only. [HCD 1]~~

1.2 Special Requirements for CPVC Installation within Residential Structures.

In addition to the other requirements in the California Plumbing Code and this Appendix for the ~~Installation Standards for~~ installation of CPVC Solvent Cemented Hot and Cold Water Distributions Systems, all installations of CPVC pipe within residential structures shall meet the following:

~~301.0.1~~ 1.2.1 Flushing Procedures. *~~301.0.1.1~~ All installations of CPVC pipe within residential structures shall be flushed twice over a period of at least one (1) week. The pipe system shall be first flushed for at least 10 minutes and then filled and allowed to stand for no less than 1 week, after which all the branches of the pipe system must be flushed long enough to fully empty the contained volume. At the time of the fill, each fixture shall have a removable tag applied stating:*

"This new plumbing system was first filled on (date) by (name). The California Department of Housing and Community Development requires that the system be flushed after standing at least one week after the fill date specified above. If the system is used earlier than one week after the fill date, the water must be allowed to run for at least two minutes prior to use for human consumption. This tag may not be removed prior to flushing, except by the homeowner." ***~~301.0.2~~ 1.2.2 Worker Safety Measures. ~~301.0.2.1~~*** *Mechanical ventilation sufficient to maintain exposures below the relevant exposure limits established by state regulations shall be provided in enclosed spaces. This ventilation shall be directed at the breathing zone of the worker installing the pipe. Where mechanical ventilation is not practical, respirators, suitable for organic vapors, shall be used. For the purpose of this subdivision, an~~d~~ enclosed space is defined as:*
(a) A space less than 100 square feet of floor area under a ceiling with a height of 10 feet or less, and which does not have openings (consisting of doors, windows, or unfinished walls) on at least two sides;
(b) Crawl spaces having a height of less than three feet;
(c) Enclosed attics that have a roof and ceiling; or
(d) Trenches having a depth greater than ~~twenty-four~~ 24 inches.

> *~~**301.0.2.2**~~ Installers of ~~CPCC~~ CPVC pipe within residential structures shall use non-latex thin gauge (4 millimeters) nitrile gloves, or other gloves providing an equivalent or better degree of protection during the installation of the CPVC plumbing system. Gloves shall be provided to all workers by the contractor, or plumbing subcontractor, and shall be replaced upon contamination by cements.*

Impact Analysis

Air Quality

The installation and repair of CPVC pipe requires either the use of one-step cement (no primer needed) or cement and a primer (collectively "Adhesives"). There are potential significant environmental impacts related to evaporation of solvents from Adhesives. Areas of concern include exposure of pipe installers to Adhesives and the effect that evaporated solvents might have as smog precursors. Pipe worker exposure is discussed separately in the Worker Safety section below.

CPVC Adhesives contain acetone, tetrahydrofuran, methyl ethyl ketone, and cyclohexanone. Volatile organic compounds ("VOCs") readily evaporate, but do not necessarily react with other chemicals to form smog. For example, although acetone is a VOC, it is not considered a reactive organic gas (ROG) because it has a low reactivity with other compounds.[254] In contrast, tetrahydrofuran, methyl ethyl ketone, and cyclohexanone are regulated as ozone precursors because they are VOCs that are highly reactive with other chemicals and thus contribute to smog. The California Air Resources Board (ARB) uses the terms "ROG" and "VOC" almost interchangeably.

Many of the local air districts' ROG Rules have exemptions that may apply to CPVC Adhesives (e.g., exemption of Adhesives that are in containers of 16 ounces or less). The Low-VOC Adhesives Alternative is a proposed change in the California Plumbing Code. As part of that change, the California Plumbing Code would impose a maximum limit on VOC content for CPVC cements and primers without exemptions. Local air district rules with exemptions for container size would not preempt the Plumbing Code. Thus, these exemptions are not significant for purposes of this EIR.

The Lead Agency has given great consideration to VOC limits in the proposed amendments to the California Plumbing Code included in this alternative. The ARB has determined that the Reasonable Available Control Technology (RACT) for VOCs in adhesives, including the cements and primers used to join CPVC pipe for potable water piping in residential buildings is

[254] The California Almanac of Emissions and Air Quality, Air Resources Board 2006 (Doc.198)

490 g/L for cement and 650 g/L for primer.[255] These are the standards imposed by most air districts with ROG rules. The ARB RACT determination was made in 1998. There are, however, currently several brands of CPVC primer on the market with a 550 g/L VOC content limit. The Lead Agency is confident that the lower limit of 550 g/L VOC content for primer is easily achievable and would not pose undue hardship. For this reason, the proposed code change imposes the ARB RACT VOC limit of 490 g/L for cement and the lower limit of 550 g/L for primer.

Currently, the vast majority of CPVC cements and primers available for use in California already have VOC content below the limits of 490 g/L for cement and 550 g/L for primer that are proposed as part of this alternative. Thus, the analysis and calculations of air quality emissions that would result from the Project, which are set forth in Section 4.2 of this RDEIR, would also apply to the Low-VOC Adhesives Alternative, since that analysis assumed a VOC content of 490 g/L for cement and 550 g/L for primer. However, the Low-VOC Adhesives Alternative would prohibit cements or primers with VOC content from exceeding the amounts assumed in the analysis of the Project in Section 4.2, ensuring that no such cements or primers would ever be used, even in local air districts with exemptions for container size to the ROG rules that would otherwise apply.

It is noteworthy that a few air districts have VOC limits that are lower than both the ARB RACT limits and the proposed code limits. The state standards would not preempt these more restrictive local air district standards. However, for these air districts, it is likely that CPVC installation will be impractical because there are no adhesives on the market that meet the standards. However, as a precautionary measure, this EIR has included those counties located in districts with more stringent standards in the emissions calculations for the Project (which also apply to the Low-VOC Adhesives Alternative), while using the higher limits proposed to be included in the California Plumbing Code. The use of the higher limits results in artificially increased estimated emissions calculated for both the Project and the Low-VOC Adhesives Alternative in those particular air districts with lower limits.

Water Quality

As discussed in Section 4.3 of this Recirculated Draft EIR, the Project would result in less than significant impacts related to water quality. The only difference between the Project and the Low VOC Adhesives Alternative is that this alternative would require the use of low-VOC cements and primers. As explained in the discussion of Impact 4.3-1, there is no evidence that solvents used to join CPVC contribute to adverse environmental impacts related to water quality. Therefore, requiring the use of low-VOC cements and primers would not change the

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[255] Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Adhesives and Sealants, Air Resources Board, 1998 (Doc.182)

conclusions of Section 4.3 regarding water quality impacts related to the Project, and that analysis also applies to the Low-VOC Adhesives Alternative.

Worker Safety

Installation of CPVC pipe requires the use of cements and primers contain four solvents: acetone (ACE), cyclohexanone (CHX), methyl ethyl ketone (MEK), and tetrahydrofuran (THF). These solvents are volatile (i.e. they evaporate readily). CPVC installers can be exposed to these solvents by skin contact and inhalation. In addition, all but acetone are considered to be ozone precursors (volatile organic compounds (VOCs)) that may contribute to the formation of smog.

Based on the 2000 MND, CPVC pipe, including the use of Adhesives, has already been approved for use in individual California residences when there has been a finding that there is or will be a premature failure of metallic pipe because of existing water or soil conditions (referred to as the "Findings Requirement"). As part of the project analyzed in the 2000 MND, certain worker safety measures were required to be included in the California Plumbing Code for CPVC pipe installations to address the issue of solvent exposures. These measures include the use of sufficient mechanical ventilation or respirators to maintain chemical exposures below the relevant exposure limits established by state regulations. Workers are also required to use non-latex thin gauge (4 millimeters) nitrile gloves, or other gloves providing an equivalent or better degree of protection, during the installation of the CPVC plumbing system.[256]

Like the Project, the Low-VOC Adhesives Alternative would remove the Findings Requirement, but would leave the worker safety measures intact. Removal of the Findings Requirement may result in an increase in the number of residential units plumbed with CPVC pipe. However, an increase in the overall number of units plumbed with CPVC pipe would not increase the extent of an individual installer's exposure to CPVC pipe adhesives during installation in an individual unit. Through the 2000 MND, it was determined that there were no potential significant impacts on worker health and safety due to worker exposure to CPVC pipe adhesives when installations are performed pursuant to the mitigation measures.

Changes in the safety profiles of some CPVC products along with the introduction of new products should result in reduced worker exposure to chemical contaminants. Since the 2000 MND was approved, the concentrations of most of the VOCs in CPVC cements and primers have been reduced. One-step cements (no primer required) are available and approved for use in California. The Low-VOC Adhesives Alternative would require the use of low-VOC cements and primers.

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[256] "Special Requirements for CPVC Installation within Residential Structures," found in the California Code of Regulations, title 24, part 5, appendix I, section 1.2.

Currently, the vast majority of CPVC cements and primers available for use in California already have VOC content below the limits of 490 g/L for cement and 550 g/L for primer that are proposed as part of the Low-VOC Adhesives Alternative. Thus, the analysis of worker safety impacts that would result from the Project, which are set forth in Section 4.4 of this RDEIR, would also apply to the Low-VOC Adhesives Alternative, since that analysis also assumed a VOC content of 490 g/L for cement and 550 g/L for primer. Section 4.4 concluded that the Project would result in less than significant worker safety impacts. The Low-VOC Adhesives Alternative would prohibit cements or primers with VOC content from exceeding the amounts assumed in the analysis of the Project in Section 4.4, ensuring that no such cements or primers would ever be used, even in local air districts with exemptions for container size to the ROG rules that would otherwise apply.

Solid Waste

If use of CPVC as a potable water piping material increases as a result of approval of the Project, this would eventually result in an increased volume of demolition debris requiring disposal. Debris would be generated when residential buildings using CPVC pipe for potable water piping are demolished, when scraps are cast off during installation, and occasionally when CPVC pipe is replaced (although it is a common industry practice for existing pipe to be left in the structure when it is replaced with new pipe). However, the analysis of the Project in this EIR concludes that compared with the existing environment, CPVC plastic does not create any significant impacts related to solid waste disposal.

The Low-VOC Adhesives Alternative would not change the amount of solid waste that would result from the Project, as the Project's potential solid waste impacts are related to disposal and recycling of CPVC pipe, rather than CPVC adhesives. Therefore, the analysis of this impact would be the same with the additional requirement that low-VOC cements and primers be used as it is for the Project.

5.3.3 Alternative C - Delete the Finding Requirements and Use Low-VOC, One-Step Cement Alternative (hereafter referred to as the "One-Step Cement Alternative")

Description

Under this alternative, the Lead Agency would recommend that the California Building Standards Commission adopt the proposed CPVC-related regulations, which would delete the Findings Requirement, and the Lead Agency would also recommend that the California Building Standards Commission adopt regulations that would require the use of Low-VOC, one-step cement for the installation of CPVC residential potable water systems. The difference between this alternative and Alternative B, the Low-VOC Adhesives Alternative, is that the One-Step Cement Alternative would require the use of one-step cement, thereby prohibiting the use of primer.

Like the Project, this alternative would include the amendment of regulations (i.e., building standards) pertaining to the use of CPVC pipe for potable water piping in buildings under the jurisdiction of the Lead Agency which include: hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including accessory buildings, facilities, and uses thereto; as well as permanent buildings, and permanent accessory buildings or structures, constructed within mobilehome parks and special occupancy parks that are under the control and ownership of the park operator.

The California Building Standards Commission would be responsible for final adoption of these amendments into the California Plumbing Code. The California Building Standards Commission receives proposed codes from a number of public agencies which have statutory authority to propose codes for various types of occupancies. The code provisions related to potable water piping in residential buildings are the responsibility of the Lead Agency.

The modifications to the existing California Plumbing Code under the One-Step Cement Alternative would entail: 1) removing the current requirement that a building official make a finding that there is or will be a premature failure of metallic pipe because of existing water or soil conditions (referred to as the “Findings Requirement”) prior to allowing CPVC to be used for potable water piping in residential structures; and 2) requiring the use of Low-VOC, one-step cements. Low-VOC, one-step cements for the installation of CPVC eliminate the need for primers and have a limited amount of volatile organic compounds (VOCs).

Use of CPVC Adhesives will cause volatile organic compounds (VOCs) to be released into the atmosphere. These VOCs can be precursors to ozone. Deleting the Findings Requirement may result in an increase in the number of residential units that are plumbed with CPVC and thus may increase the amount of ozone precursors emitted. This impact would be reduced by the requirement of low-VOC, one-step cement.

Proposed Code Changes: Alternative C – One-Step Cement Alternative

CPVC RELATED EXPRESS TERMS FOR PROPOSED BUILDING STANDARDS OF THE DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT REGARDING THE ADOPTION BY REFERENCE OF THE 2006 EDITION OF THE UNIFORM PLUMBING CODE WITH PROPOSED AMENDMENTS INTO THE 2007 CALIFORNIA PLUMBING CODE, CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 5

LEGEND FOR EXPRESS TERMS:

Existing California amendments or code language being modified: All such language appears in *italics*; modified language is underlined or shown in ~~strikeout~~.

New Uniform Plumbing Code language with new California amendments: Uniform Plumbing Code language shown in normal Arial 11 point; California amendments to Uniform Plumbing Code text shown <u>*underlined and in italics*</u>.

3. Repealed text: All such language appears in ~~strikeout.~~

4. Notation: Authority and Reference citations are provided at the end of each chapter.

AMENDMENTS:

CHAPTER 2
DEFINITIONS

Adopt entire Chapter 2 as amended.

215.0
<u>***Low-VOC, One-Step Cement:*** *Listed solvent cements that do not require the use of a primer with a volatile organic compound (VOC) content of less than or equal to 490 g/L for CPVC Cement, 510 g/L for PVC Cement, and 325 g/L for ABS Cement, as determined by the South Coast Air Quality Management District's* Laboratory Methods of Analysis for Enforcement Samples, *Method 316A.*</u>

CHAPTER 3
GENERAL REGULATIONS

316.1.6 Solvent Cement Plastic Pipe Joints. Plastic pipe and fittings designed to be joined by solvent cementing shall comply with appropriate IAPMO Installation Standards.

ABS pipe and fittings shall be cleaned and then joined with solvent cement(s).
CPVC pipe and fittings shall be cleaned and then joined with listed *primer(s) and* solvent cement(s*).*

<u>(1)</u> Exception: Listed solvent cements that do not require the use of primer shall be permitted for use with CPVC pipe and fittings, manufactured in accordance with ASTM D2846, 1/2 inch through 2 inches in diameter.

<u>**(2) [HCD 1 & HCD 2**] *Low VOC One-Step Cement that does not require the use of primer shall be utilized with CPVC pipe and fittings, manufactured in accordance with ASTM D2846, ½ inch through 2 inches in diameter.*</u>

PVC pipe and fittings shall be cleaned and joined with primer(s) and solvent cement(s). A solvent cement transition joint between ABS and PVC building drain or building sewer shall be made using a listed transition solvent cement.

For applications listed in 108.2.1 through 108.2.1.3 regulated by the Department of Housing and Community Development, plastic pipe and fittings joined with solvent cement shall utilize Low-VOC, One-Step Cement(s) as defined in Section 215.

~~***316.1.6.1 [For HCD 1 & HCD 2] Solvent Cement Plastic Pipe Joints.*** *Plastic pipe and fittings designed to be joined by solvent cementing shall comply with Section 310.4 of this code and an approved nationally recognized installation standard listed in Table 14-1.*~~

~~*ABS pipe and fittings shall be cleaned and then joined with listed solvent cement(s).*~~

~~*CPVC and PVC pipe and fittings shall be cleaned and joined with listed primer(s) and solvent cement(s).*~~

CHAPTER 6
WATER SUPPLY AND DISTRIBUTION

~~***604.1.1 [For HCD 1 & HCD 2]*** *Water distribution pipe, building supply water pipe and fittings shall be of brass, copper, cast iron, galvanized malleable iron, galvanized wrought iron, galvanized steel, or other approved materials. Asbestos-cement, CPVC, PE or PVC, water pipe manufactured to recognized standards may be used for cold water distribution systems outside a building except as provided for CPVC use pursuant to Section 604.1.2. All materials used in the water supply system, except valves and similar devices shall be of a like material, except where other wise approved by the Administrative Authority.*~~

Section 604.1.1~~2~~ ~~[HCD 1]~~ Local Authority to Approve CPVC Pipe Within Residential Buildings Under Specified Conditions

For applications listed in 108.2.1.1 ~~through 108.2.1.3~~ regulated by the Department of Housing and Community Development, ~~T~~ the local responsible building official of any city, county, or city and county, in accordance with the procedures set forth in Chapter 3, ~~(with the exception of Section 301.2.7)~~ ~~may~~ shall authorize by permit the use of CPVC for hot and cold water distribution systems within the interior of residential buildings provided all of the following conditions are satisfied:

~~***(a) Finding Required.*** *The building official shall first make a determination that there is or will be the premature failure of metallic pipe if installed in such residential buildings due to existing water or soil conditions.*~~

(a)~~(b)~~ Permit Conditions. *Any building permit issued pursuant to ~~this~~ Section 604.1.1 shall be conditioned on compliance with the mitigation measures set forth in this Section.*

(b)~~(c)~~ Approved Materials. *Only CPVC plumbing material listed as an approved material ~~in~~, and installed in accordance with this code may be used.*

(c)~~(d)~~ Installation and Use. *Any installation and use of CPVC plumbing material pursuant to this Section shall comply with all applicable requirements of this code and Section 1.2 of Appendix I of this code, Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distributions Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

(d)~~(e)~~ Certification of Compliance. *Prior to issuing a building permit pursuant to ~~this~~ Section 604.1.1, the building official shall require as part of the permitting process that the contractor, or the appropriate plumbing subcontractors, provide written certification: (1) that is required in subdivision (e)~~(f)~~; and (2) that he or she will comply with the flushing procedures and worker safety measures set forth in Section 1.2 of Appendix I of this code, Installation Standard for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

(e)~~(f)~~ Worker Safety. *Any contractor applying for a building permit that includes the use of CPVC plumbing materials authorized pursuant to this Section shall include in the permit application a signed written certification stating that~~:~~;*
(1) They are aware of the health and safety hazards associated with CPVC plumbing installations.
(2) They have included in their Illness and Injury Prevention Plan the hazards associated with CPVC plumbing pipe installations; and
(3) The worker safety training elements of their Injury and Illness Prevention Plan meet~~s~~ the Department of Industrial Relations' guidelines.

(f)~~(g)~~ Findings of Compliance. *The building official shall not give final permit approval of any CPVC plumbing materials installed pursuant to ~~this~~ Section 604.1.1 unless he or she finds that the material has been installed in compliance with the requirements of this code and that the installer has complied with the requirements in Section ~~301.0.1~~ 1.2.1, of Appendix I of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005.*

(g)~~(h)~~ Penalties. *Any contractor or subcontractor found to have failed to comply with the ventilation, glove or flushing requirements of Section ~~301.0~~ 1.2.2 of Appendix I of this code, Installation Standards for CPVC Solvent Cemented Hot and Cold Water Distribution Systems, IAPMO ~~IS 20-98~~ IS 20-2005 shall be subject to the penalties in Health and Safety Code, Division 13, Part 1.5, Chapter 6 (Section 17995 et seq.). In addition, if during the conduct of any building inspection the building official finds that the ventilation and glove requirements of Section ~~301.0~~ 1.2.2 of Appendix I of this code, "Special Requirements for CPVC Installation within Residential Buildings", are being violated, such building~~s~~ officials shall cite the contractor or subcontractor for that violation.*

APPENDIX I
INSTALLATION STANDARDS

Adopt entire Appendix I as amended.

INSTALLATION STANDARD
FOR
CPVC SOLVENT CEMENTED HOT AND COLD WATER DISTRIBUTION SYSTEMS
IAPMO IS 20-~~2003~~ 2005

~~Section 301.0 Special Requirements for CPVC Installation Within Residential Buildings Only. [HCD 1]~~

1.2 Special Requirements for CPVC Installation within Residential Structures.

In addition to the other requirements in the California Plumbing Code and this Appendix for the ~~Installation Standards for~~ installation of CPVC Solvent Cemented Hot and Cold Water Distributions Systems, all installations of CPVC pipe within residential structures shall meet the following:

~~301.0.1~~ 1.2.1 Flushing Procedures. ~~301.0.1.1~~ *All installations of CPVC pipe within residential structures shall be flushed twice over a period of at least one (1) week. The pipe system shall be first flushed for at least 10 minutes and then filled and allowed to stand for no less than 1 week, after which all the branches of the pipe system must be flushed long enough to fully empty the contained volume. At the time of the fill, each fixture shall have a removable tag applied stating:*

"This new plumbing system was first filled on (date) by (name). The California Department of Housing and Community Development requires that the system be flushed after standing at least one week after the fill date specified above. If the system is used earlier than one week after the fill date, the water must be allowed to run for at least two minutes prior to use for human consumption. This tag may not be removed prior to flushing, except by the homeowner." ***~~301.0.2~~ 1.2.2 Worker Safety Measures. ~~301.0.2.1~~*** *Mechanical ventilation sufficient to maintain exposures below the relevant exposure limits established by state regulations shall be provided in enclosed spaces. This ventilation shall be directed at the breathing zone of the worker installing the pipe. Where*

mechanical ventilation is not practical, respirators, suitable for organic vapors, shall be used. For the purpose of this subdivision, an~~d~~ enclosed space is defined as:

(a) A space less than 100 square feet of floor area under a ceiling with a height of 10 feet or less, and which does not have openings (consisting of doors, windows, or unfinished walls) on at least two sides;

(b) Crawl spaces having a height of less than three feet;

(c) Enclosed attics that have a roof and ceiling; or

(d) Trenches having a depth greater than ~~twenty-four~~ 24 inches.

~~301.0.2.2~~ *Installers of ~~CPCC~~ CPVC pipe within residential structures shall use non-latex thin gauge (4 millimeters) nitrile gloves, or other gloves providing an equivalent or better degree of protection during the installation of the CPVC plumbing system. Gloves shall be provided to all workers by the contractor, or plumbing subcontractor, and shall be replaced upon contamination by cements.*

Impact Analysis

Air Quality

Currently, the installation and repair of CPVC pipe requires either the use of one-step cement (no primer needed) or cement and a primer (collectively "Adhesives"). There is a potential significant air quality impact related to evaporation of solvents from Adhesives, which is the effect that evaporated solvents might have as smog precursors.

CPVC Adhesives contain acetone, tetrahydrofuran, methyl ethyl ketone, and cyclohexanone. Volatile organic compounds ("VOCs") readily evaporate, but do not necessarily react with other chemicals to form smog. For example, although acetone is a VOC, it is not considered a reactive organic gas (ROG) because it has a low reactivity with other compounds.[257] In contrast, tetrahydrofuran, methyl ethyl ketone, and cyclohexanone are regulated as ozone precursors because they are VOCs that are highly reactive with other chemicals and thus contribute to smog. The California Air Resources Board (ARB) uses the terms "ROG" and "VOC" almost interchangeably.

Many of the local air districts' ROG Rules have exemptions that may apply to CPVC Adhesives (e.g., exemption of Adhesives that are in containers of 16 ounces or less). Under the One-Step Cement Alternative, the California Plumbing Code would require the use of one-step CPVC cements (i.e., cements that do not require the use of primer), and would impose a maximum limit on VOC content for CPVC cements without exemptions. The Plumbing Code changes that are proposed as part of the Project would not include these two requirements.

The Lead Agency has given great consideration to VOC limits in the proposed amendments to the California Plumbing Code included in the One-Step Cement Alternative. The ARB has determined that the Reasonable Available Control Technology (RACT) for VOCs in the cements

[257] The California Almanac of Emissions and Air Quality, Air Resources Board 2006 (Doc.198)

used to join CPVC pipe for potable water piping in residential buildings is 490 g/L.[258] This is the standard imposed by most air districts with ROG rules. For this reason, the code change that is proposed as part of the One-Step Cement Alternative imposes the ARB RACT VOC limit of 490 g/L for cement.

Since one-step cement has the same VOC content and application rate as cement when used in conjunction with primer, the One-Step Cement Alternative would have the effect of eliminating all ROG emissions associated with primer usage, as well as imposing a maximum VOC limit for CPVC cements. The reduction in emissions that would be achieved under the One-Step Cement Alternative is identical to the reduction in emissions that would be achieved if the Project were adopted with Mitigation Measure 4.2-1 in place. As indicated in the discussion of Mitigation Measure 4.2-1 in Section 4.2 of this RDEIR, it is estimated that the use of one-step cement would lower ROG emissions by 25% for single-family structures uses and 21% for multi-family residential structures. This reduction is shown in Tables 4.2.4.12 through 4.2.4.15, which compare ROG emissions with "cement only" to "cement + primer." This reduction would reduce ROG emissions to a less than significant level for the Feather River Air Quality Management District. However, ROG emissions would still exceed the significance thresholds of several other air districts, as specified in the discussion of Mitigation Measure 4.2-1. Therefore, air quality impacts of the One-Step Cement Alternative would be significant and unavoidable, although reduced in comparison to the Project.

Water Quality

As discussed in Section 4.3 of this Recirculated Draft EIR, the Project would result in less than significant impacts related to water quality. The only differences between the Project and the One-Step Cement Alternative is that this alternative would eliminate the use of primers and reduce VOC emissions by requiring low-VOC, one-step cement. As explained in the discussion of Impact 4.3-1, there is no evidence that solvents used to join CPVC contribute to adverse environmental impacts related to water quality. Therefore, requiring the use of low-VOC, one-step cement would not change the conclusions of Section 4.3 regarding water quality impacts related to the Project, and that analysis also applies to the One-Step Cement Alternative.

Worker Safety

Installation of CPVC pipe requires the use of cements and sometimes primers (collectively: Adhesives). The Adhesives contain four solvents: acetone, cyclohexanone, methyl ethyl ketone (MEK), and tetrahydrofuran (THF). These solvents are volatile (i.e. they evaporate readily). CPVC installers can be exposed to these solvents by skin contact and inhalation.

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[258] Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Adhesives and Sealants, Air Resources Board, 1998 (Doc.182)

Based on the 2000 MND, CPVC pipe, including the use of Adhesives, has already been approved for use in individual California residences when there has been a finding that there is or will be a premature failure of metallic pipe because of existing water or soil conditions (referred to as the "Findings Requirement"). As part of the project analyzed in the 2000 MND, certain worker safety measures were required to be included in the California Plumbing Code for CPVC pipe installations to address the issue of solvent exposures. These measures include the use of sufficient mechanical ventilation or respirators to maintain chemical exposures below the relevant exposure limits established by state regulations. Workers are also required to use non-latex thin gauge (4 millimeters) nitrile gloves, or other gloves providing an equivalent or better degree of protection, during the installation of the CPVC plumbing system.[259]

Like the proposed Project, the One-Step Cement Alternative would remove the Findings Requirement, but would leave the worker safety measures intact. Removal of the Findings Requirement may result in an increase in the number of residential units plumbed with CPVC pipe. However, an increase in the overall number of units plumbed with CPVC pipe would not increase the extent of an individual installer's exposure to CPVC pipe adhesives during installation in an individual unit. Through the 2000 MND, it was determined that there were no potential significant impacts on worker health and safety due to worker exposure to CPVC pipe adhesives when installations are performed pursuant to the mitigation measures.

Changes in the safety profiles of some CPVC products along with the introduction of new products should result in reduced worker exposure to chemical contaminants. Since the 2000 MND was approved, the concentrations of most of the VOCs in CPVC adhesives have been reduced. One-step cements (no primer required) are available and approved for use in California. The One-Step Cement Alternative would require the use of one-step cements. Reducing the amount of Adhesives needed to be used due to the elimination of the use of primer will reduce the quantities of chemicals to which workers are exposed.

The 2000 MND analyzed the health impacts of CPVC installation on pipe workers. The 2000 MND found that with the mitigation measures that were subsequently adopted into the California Plumbing Code, the impacts to pipe workers were less than significant. Due to the requirement of low-VOC, one-step cement, the impacts to pipe workers under the One-Step Cement Alternative would be reduced even further in comparison to the project analyzed in the 2000 MND.

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[259] "Special Requirements for CPVC Installation within Residential Structures," found in the California Code of Regulations, title 24, part 5, appendix I, section 301.0.

Solid Waste

If use of CPVC as a potable water piping material increases as a result of approval of the Project, this would eventually result in an increased volume of demolition debris requiring disposal. Debris would be generated when residential buildings using CPVC pipe for potable water piping are demolished, when scraps are cast off during installation, and occasionally when CPVC pipe is replaced (although it is a common industry practice for existing pipe to be left in the structure when it is replaced with new pipe). However, the analysis of the Project in this EIR concludes that compared with the existing environment, CPVC plastic does not create any significant impacts related to solid waste disposal.

The One-Step Cement Alternative would not change the amount of solid waste that would result from the Project, as the Project's potential solid waste impacts are related to disposal and recycling of CPVC pipe, rather than Adhesives. Therefore, the analysis of this impact would be the same with the additional requirement that low-VOC, one-step cements be used as it is for the Project.

5.4 Environmentally Superior Alternative

Table 5.4-1 compares the potential impacts of the Project with both of the alternatives evaluated in this section of the EIR. The analysis of the Project in this EIR identifies significant unavoidable impacts associated with air quality on a project-specific and cumulative basis. A side-by-side comparison of the issues as evaluated in this RDEIR is provided in Table 5.4-1 for each of the alternatives.

Similar to the Project, the Low-VOC Adhesives Alternative reduces impacts associated with the use of copper pipe due to the anticipated reduction in the share of copper in the market for potable water pipe. However, the Low-VOC Adhesives Alternative also would reduce the potential air quality impacts that could result from the Project by ensuring that no cements or primers are used that have a VOC content that exceeds specified limits. The One-Step Cement Alternative would reduce the potential air quality impacts even further by eliminating the use of primer, resulting in a reduction of ROG emissions by 25% for single-family structures uses and 21% for multi-family residential structures. Therefore, the One-Step Cement Alternative is considered the environmentally superior alternative.

Table 5.4-1 Comparison of Impacts of the Alternatives to the Project

Environmental Issue	No Project Alternative	Low-VOC Adhesives Alternative	One-Step Cement Alternative

Air Quality	Superior	Somewhat Superior	Superior
Water Quality	Inferior	Equivalent	Equivalent
Worker Safety	Somewhat Inferior	Somewhat Superior	Superior
Solid Waste	Somewhat Superior	Equivalent	Equivalent

List of Tables

Table 5.3.1.1: Assumptions and Constants Used to Determine the ROG Emissions Associated with Exising Conditions

Assumptions and Constants	
New House Design Market Share	13%
New House Upper Limit Market Share	13%
Re-pipe Design Market Share	13%
Re-pipe Upper Limit Market Share	13%
Slab Repair Design Market Share	13%
Slab Repair Upper Limit Market Share	13%
Design Slab Repair (% of total fittings)/New House	5%
Upper Limit Slab Repair (% of total fittings)/New House	10%
Cement ROG Content (g/L)	490
Primer ROG Content (g/L)	550
MF Cement Use/House (L)	0.42
SF Cement Use/House (L)	0.81
MF Primer Use/House (L)	0.11
SF Primer Use/House (L)	0.27
Safety Factor	2.00
Number of Construction days / year	196
Average Number of Re-pipes / year	100,000
Number of Slab Repairs/year	200,000

**TABLE 5.3.1.2:
DEFINITIONS AND FOOTNOTES COMMON TO
THE EXISING CONDITIONS ANALYSIS TABLES**

Definitions:

SF	Single Family Unit
MF	Multiple Family Unit
S.F.	Safety Factor
σ	Standard Deviation
Design	Conservatively Estimated Expected Future Value
Upper Limit	Maximum Conceivable (Within Reason) Future Value
Max	Same as Upper Limit

Footnotes:

[1] New Housing Estimates are based on the greater of the 1967-2005 approach (mean + 2 standard deviations) or the 2003 -2005 approach (mean + 1 standard deviations)

[2] New houses design value times the design and maximum (Upper) Market share for CPVC

[3] Avg. number of re-pipes per year, times the recent (2003-2005) County % of New Houses, times the lower (Average) and Upper (Max) Market share for re-pipes

[4] Est. number of slab repairs per year, times the recent (2003-2005) County % of New Houses, times the design and upper limit (Max) Market share for slab repairs times, times the percent of total fittings in a house that are typically replaced in a "Slab Repair"

[5] New CPVC Houses + Re-Pipe Houses + Slab Repair Houses

[6] Equivalent House Installations times Primer and Cement use per house, times respective ROG content

[7] Total = Primer plus Cement ROG Emissions

Table 5.3.1.3: Total Annual ROG Emission Rate (Cement and Primer) for Existing Conditions														
County	Primer ROG Emissions[6] (tons/year)				Cement ROG Emissions[6] (tons/year)				Total ROG Emissions[7] - No Safety Factor (tons/year)					
	MF Design[1]	SF Design[1]	MF Max	SF Max	MF Design[1]	SF Design[1]	MF Max	SF Max	MF Design[1]	SF Design[1]	MF+SF Design[1]	MF Max	SF Max	MF+SF Max
ALAMEDA	0.07	0.14	0.07	0.14	0.22	0.37	0.23	0.37	0.29	0.51	0.79	0.29	0.51	0.81
ALPINE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
AMADOR	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04	0.01	0.05	0.06	0.01	0.05	0.06
BUTTE	0.01	0.06	0.01	0.06	0.04	0.15	0.04	0.15	0.05	0.21	0.25	0.05	0.21	0.26
CALAVERAS	0.00	0.03	0.00	0.03	0.00	0.08	0.00	0.08	0.00	0.11	0.11	0.00	0.11	0.12
COLUSA	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02	0.02
CONTRA COSTA	0.05	0.21	0.05	0.21	0.17	0.55	0.17	0.56	0.22	0.76	0.97	0.22	0.77	0.99
DEL NORTE	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.02	0.02	0.01	0.02	0.02
EL DORADO	0.00	0.08	0.00	0.08	0.02	0.20	0.02	0.21	0.02	0.28	0.30	0.02	0.29	0.31
FRESNO	0.04	0.20	0.05	0.20	0.15	0.53	0.16	0.55	0.20	0.73	0.93	0.20	0.75	0.95
GLENN	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.02	0.00	0.02	0.03
HUMBOLDT	0.00	0.02	0.00	0.02	0.01	0.05	0.01	0.05	0.01	0.06	0.08	0.01	0.07	0.08
IMPERIAL	0.01	0.06	0.01	0.07	0.02	0.17	0.03	0.18	0.03	0.24	0.27	0.03	0.24	0.28
INYO	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01
KERN	0.03	0.25	0.03	0.26	0.09	0.68	0.09	0.70	0.11	0.93	1.05	0.12	0.96	1.07
KINGS	0.00	0.03	0.00	0.03	0.01	0.09	0.01	0.09	0.02	0.12	0.14	0.02	0.12	0.14
LAKE	0.00	0.02	0.00	0.02	0.00	0.05	0.00	0.05	0.01	0.07	0.08	0.01	0.07	0.08
LASSEN	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.03	0.03	0.00	0.03	0.03
LOS ANGELES	0.44	0.54	0.45	0.55	1.51	1.44	1.53	1.47	1.96	1.98	3.94	1.98	2.03	4.01
MADERA	0.00	0.06	0.00	0.06	0.01	0.16	0.01	0.17	0.02	0.22	0.24	0.02	0.23	0.25
MARIN	0.01	0.03	0.01	0.04	0.05	0.09	0.05	0.09	0.06	0.13	0.19	0.06	0.13	0.19
MARIPOSA	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02	0.02
MENDOCINO	0.00	0.02	0.00	0.02	0.01	0.04	0.01	0.04	0.01	0.06	0.07	0.01	0.06	0.07
MERCED	0.01	0.11	0.01	0.11	0.03	0.28	0.03	0.29	0.03	0.39	0.42	0.03	0.40	0.44
MODOC	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01
MONO	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.03	0.02	0.05	0.03	0.02	0.05
MONTEREY	0.02	0.05	0.02	0.05	0.05	0.13	0.05	0.13	0.07	0.18	0.25	0.07	0.18	0.25

Table 5.3.1.3: Total Annual ROG Emission Rate (Cement and Primer) for Existing Conditions														
	Primer ROG Emissions[6] (tons/year)				Cement ROG Emissions[6] (tons/year)				Total ROG Emissions[7] - No Safety Factor (tons/year)					
	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
NAPA	0.01	0.03	0.01	0.03	0.02	0.07	0.02	0.07	0.02	0.09	0.12	0.02	0.10	0.12
NEVADA	0.00	0.05	0.00	0.05	0.01	0.13	0.01	0.13	0.01	0.17	0.19	0.01	0.18	0.19
ORANGE	0.17	0.40	0.17	0.41	0.59	1.08	0.59	1.09	0.76	1.48	2.24	0.77	1.50	2.27
PLACER	0.01	0.18	0.01	0.19	0.05	0.49	0.05	0.50	0.06	0.67	0.74	0.06	0.69	0.76
PLUMAS	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.03	0.00	0.04	0.04	0.00	0.04	0.04
RIVERSIDE	0.09	1.09	0.09	1.12	0.29	2.90	0.30	2.98	0.38	3.99	4.37	0.38	4.10	4.48
SACRAMENTO	0.08	0.36	0.08	0.37	0.28	0.97	0.28	1.00	0.36	1.33	1.69	0.36	1.37	1.73
SAN BENITO	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04	0.01	0.05	0.06	0.01	0.05	0.06
SAN BERNARDINO	0.09	0.53	0.09	0.55	0.31	1.42	0.31	1.46	0.40	1.95	2.35	0.40	2.00	2.41
SAN DIEGO	0.24	0.48	0.25	0.49	0.83	1.28	0.84	1.31	1.07	1.76	2.83	1.08	1.79	2.88
SAN FRANCISCO	0.04	0.01	0.04	0.01	0.13	0.02	0.14	0.02	0.17	0.03	0.20	0.18	0.03	0.21
SAN JOAQUIN	0.02	0.24	0.02	0.25	0.08	0.64	0.08	0.66	0.10	0.88	0.98	0.10	0.91	1.01
SAN LUIS OBISPO	0.01	0.07	0.01	0.08	0.04	0.20	0.04	0.20	0.05	0.27	0.33	0.05	0.28	0.33
SAN MATEO	0.03	0.06	0.04	0.06	0.12	0.15	0.12	0.16	0.15	0.21	0.37	0.15	0.21	0.37
SANTA BARBARA	0.02	0.05	0.02	0.05	0.06	0.12	0.06	0.13	0.08	0.17	0.25	0.08	0.17	0.25
SANTA CLARA	0.10	0.23	0.10	0.23	0.33	0.61	0.33	0.62	0.42	0.84	1.27	0.43	0.85	1.29
SANTA CRUZ	0.01	0.04	0.01	0.04	0.04	0.12	0.04	0.12	0.05	0.16	0.21	0.05	0.16	0.21
SHASTA	0.01	0.05	0.01	0.05	0.02	0.13	0.02	0.13	0.03	0.18	0.21	0.03	0.18	0.21
SIERRA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
SISKIYOU	0.00	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	0.04	0.05	0.01	0.04	0.05
SOLANO	0.02	0.12	0.02	0.12	0.06	0.31	0.06	0.31	0.08	0.42	0.50	0.08	0.43	0.51
SONOMA	0.02	0.10	0.02	0.10	0.08	0.26	0.08	0.26	0.10	0.36	0.45	0.10	0.36	0.46
STANISLAUS	0.02	0.16	0.02	0.16	0.06	0.43	0.06	0.44	0.07	0.59	0.66	0.07	0.60	0.68
SUTTER	0.00	0.04	0.00	0.04	0.01	0.11	0.01	0.12	0.02	0.16	0.17	0.02	0.16	0.18
TEHAMA	0.00	0.02	0.00	0.02	0.01	0.06	0.01	0.06	0.01	0.08	0.09	0.01	0.08	0.09
TRINITY	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.02	0.00	0.01	0.02
TULARE	0.01	0.09	0.01	0.09	0.03	0.24	0.03	0.25	0.04	0.33	0.37	0.04	0.34	0.38
TUOLUMNE	0.00	0.02	0.00	0.02	0.00	0.06	0.00	0.06	0.01	0.08	0.09	0.01	0.08	0.09

Table 5.3.1.3: Total Annual ROG Emission Rate (Cement and Primer) for Existing Conditions														
	Primer ROG Emissions[6] (tons/year)				Cement ROG Emissions[6] (tons/year)				Total ROG Emissions[7] - No Safety Factor (tons/year)					
	MF	SF	MF	SF	MF	SF	MF	SF	MF	SF	MF+SF	MF	SF	MF+SF
County	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
VENTURA	0.04	0.15	0.04	0.15	0.13	0.39	0.13	0.40	0.16	0.54	0.70	0.16	0.55	0.71
YOLO	0.01	0.05	0.01	0.05	0.04	0.14	0.04	0.14	0.05	0.19	0.24	0.05	0.20	0.25
YUBA	0.00	0.05	0.00	0.05	0.01	0.14	0.01	0.14	0.01	0.19	0.20	0.01	0.19	0.20
STATEWIDE TOTAL	2	7	2	7	6	18	6	18	8	24	32	8	25	33

Table 5.3.1.4: Total Annual ROG Emission Rate with Safety Factor for Existing Conditions

County	Total ROG Emissions[7] - No Safety Factor (tons/year)						Total ROG Emissions[7] - With Safety Factor (tons/year)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	0.29	0.51	0.79	0.29	0.51	0.81	0.57	1.01	1.59	0.58	1.03	1.61
ALPINE	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01
AMADOR	0.01	0.05	0.06	0.01	0.05	0.06	0.01	0.10	0.11	0.01	0.10	0.12
BUTTE	0.05	0.21	0.25	0.05	0.21	0.26	0.09	0.41	0.51	0.09	0.42	0.52
CALAVERAS	0.00	0.11	0.11	0.00	0.11	0.12	0.01	0.22	0.22	0.01	0.23	0.23
COLUSA	0.00	0.02	0.02	0.00	0.02	0.02	0.01	0.04	0.05	0.01	0.04	0.05
CONTRA COSTA	0.22	0.76	0.97	0.22	0.77	0.99	0.44	1.51	1.95	0.44	1.55	1.99
DEL NORTE	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.03	0.05	0.01	0.03	0.05
EL DORADO	0.02	0.28	0.30	0.02	0.29	0.31	0.04	0.56	0.60	0.04	0.57	0.62
FRESNO	0.20	0.73	0.93	0.20	0.75	0.95	0.40	1.46	1.86	0.40	1.50	1.90
GLENN	0.00	0.02	0.02	0.00	0.02	0.03	0.01	0.04	0.05	0.01	0.04	0.05
HUMBOLDT	0.01	0.06	0.08	0.01	0.07	0.08	0.03	0.13	0.15	0.03	0.13	0.16
IMPERIAL	0.03	0.24	0.27	0.03	0.24	0.28	0.06	0.47	0.54	0.07	0.48	0.55
INYO	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.02	0.02
KERN	0.11	0.93	1.05	0.12	0.96	1.07	0.23	1.86	2.09	0.23	1.92	2.15
KINGS	0.02	0.12	0.14	0.02	0.12	0.14	0.04	0.24	0.28	0.04	0.25	0.28
LAKE	0.01	0.07	0.08	0.01	0.07	0.08	0.01	0.14	0.15	0.01	0.14	0.16
LASSEN	0.00	0.03	0.03	0.00	0.03	0.03	0.01	0.05	0.06	0.01	0.05	0.06
LOS ANGELES	1.96	1.98	3.94	1.98	2.03	4.01	3.92	3.97	7.88	3.97	4.05	8.02
MADERA	0.02	0.22	0.24	0.02	0.23	0.25	0.03	0.44	0.48	0.03	0.46	0.49
MARIN	0.06	0.13	0.19	0.06	0.13	0.19	0.12	0.25	0.37	0.12	0.26	0.38
MARIPOSA	0.00	0.02	0.02	0.00	0.02	0.02	0.00	0.04	0.05	0.00	0.05	0.05
MENDOCINO	0.01	0.06	0.07	0.01	0.06	0.07	0.02	0.12	0.14	0.02	0.12	0.14
MERCED	0.03	0.39	0.42	0.03	0.40	0.44	0.07	0.78	0.85	0.07	0.80	0.87
MODOC	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.02	0.02
MONO	0.03	0.02	0.05	0.03	0.02	0.05	0.06	0.04	0.09	0.06	0.04	0.10
MONTEREY	0.07	0.18	0.25	0.07	0.18	0.25	0.14	0.36	0.50	0.14	0.37	0.51

Table 5.3.1.4: Total Annual ROG Emission Rate with Safety Factor for Existing Conditions

County	Total ROG Emissions[7] - No Safety Factor (tons/year)						Total ROG Emissions[7] - With Safety Factor (tons/year)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
NAPA	0.02	0.09	0.12	0.02	0.10	0.12	0.05	0.19	0.23	0.05	0.19	0.24
NEVADA	0.01	0.17	0.19	0.01	0.18	0.19	0.03	0.34	0.37	0.03	0.35	0.38
ORANGE	0.76	1.48	2.24	0.77	1.50	2.27	1.52	2.96	4.48	1.54	2.99	4.53
PLACER	0.06	0.67	0.74	0.06	0.69	0.76	0.13	1.35	1.48	0.13	1.39	1.51
PLUMAS	0.00	0.04	0.04	0.00	0.04	0.04	0.01	0.08	0.08	0.01	0.08	0.09
RIVERSIDE	0.38	3.99	4.37	0.38	4.10	4.48	0.75	7.98	8.73	0.77	8.20	8.96
SACRAMENTO	0.36	1.33	1.69	0.36	1.37	1.73	0.72	2.67	3.38	0.73	2.74	3.47
SAN BENITO	0.01	0.05	0.06	0.01	0.05	0.06	0.01	0.10	0.11	0.01	0.10	0.11
SAN BERNARDINO	0.40	1.95	2.35	0.40	2.00	2.41	0.80	3.90	4.70	0.81	4.01	4.81
SAN DIEGO	1.07	1.76	2.83	1.08	1.79	2.88	2.14	3.52	5.66	2.17	3.59	5.76
SAN FRANCISCO	0.17	0.03	0.20	0.18	0.03	0.21	0.35	0.06	0.40	0.35	0.06	0.41
SAN JOAQUIN	0.10	0.88	0.98	0.10	0.91	1.01	0.20	1.76	1.96	0.20	1.81	2.01
SAN LUIS OBISPO	0.05	0.27	0.33	0.05	0.28	0.33	0.10	0.55	0.65	0.10	0.56	0.67
SAN MATEO	0.15	0.21	0.37	0.15	0.21	0.37	0.31	0.43	0.73	0.31	0.43	0.74
SANTA BARBARA	0.08	0.17	0.25	0.08	0.17	0.25	0.16	0.34	0.50	0.16	0.35	0.51
SANTA CLARA	0.42	0.84	1.27	0.43	0.85	1.29	0.85	1.69	2.54	0.86	1.71	2.57
SANTA CRUZ	0.05	0.16	0.21	0.05	0.16	0.21	0.10	0.32	0.42	0.10	0.33	0.42
SHASTA	0.03	0.18	0.21	0.03	0.18	0.21	0.06	0.35	0.41	0.06	0.36	0.42
SIERRA	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01
SISKIYOU	0.01	0.04	0.05	0.01	0.04	0.05	0.01	0.08	0.10	0.02	0.09	0.10
SOLANO	0.08	0.42	0.50	0.08	0.43	0.51	0.16	0.85	1.00	0.16	0.86	1.02
SONOMA	0.10	0.36	0.45	0.10	0.36	0.46	0.20	0.71	0.91	0.20	0.72	0.92
STANISLAUS	0.07	0.59	0.66	0.07	0.60	0.68	0.15	1.18	1.33	0.15	1.21	1.36
SUTTER	0.02	0.16	0.17	0.02	0.16	0.18	0.03	0.31	0.35	0.03	0.32	0.35
TEHAMA	0.01	0.08	0.09	0.01	0.08	0.09	0.02	0.15	0.17	0.02	0.16	0.18
TRINITY	0.00	0.01	0.02	0.00	0.01	0.02	0.00	0.03	0.03	0.00	0.03	0.03
TULARE	0.04	0.33	0.37	0.04	0.34	0.38	0.09	0.66	0.75	0.09	0.68	0.77
TUOLUMNE	0.01	0.08	0.09	0.01	0.08	0.09	0.01	0.16	0.17	0.01	0.17	0.18
VENTURA	0.16	0.54	0.70	0.16	0.55	0.71	0.32	1.07	1.40	0.33	1.09	1.42

Table 5.3.1.4: Total Annual ROG Emission Rate with Safety Factor for Existing Conditions

County	Total ROG Emissions[7] - No Safety Factor (tons/year)							Total ROG Emissions[7] - With Safety Factor (tons/year)					
	MF	SF	MF+SF	MF	SF	MF+SF		MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max		Design[1]	Design[1]	Design[1]	Max	Max	Max
YOLO	0.05	0.19	0.24	0.05	0.20	0.25		0.10	0.38	0.48	0.10	0.39	0.50
YUBA	0.01	0.19	0.20	0.01	0.19	0.20		0.02	0.38	0.40	0.02	0.39	0.41
Statewide Total	**8**	**24**	**32**	**8**	**25**	**33**		**16**	**49**	**65**	**16**	**50**	**66**

Table 5.3.1.5: Total Annual Cement Only ROG Rate with Safety Factor for Existing Conditions

County	Cement Only ROG Emissions (tons/year) - No Saf. Fac.						Cement Only ROG Emissions (tons/year) - With Saf. Fac.					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	0.22	0.37	0.59	0.23	0.37	0.60	0.44	0.74	1.18	0.45	0.75	1.20
ALPINE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01
AMADOR	0.00	0.04	0.04	0.00	0.04	0.04	0.01	0.07	0.08	0.01	0.08	0.08
BUTTE	0.04	0.15	0.19	0.04	0.15	0.19	0.07	0.30	0.37	0.07	0.31	0.38
CALAVERAS	0.00	0.08	0.08	0.00	0.08	0.08	0.00	0.16	0.16	0.00	0.16	0.17
COLUSA	0.00	0.02	0.02	0.00	0.02	0.02	0.00	0.03	0.03	0.00	0.03	0.04
CONTRA COSTA	0.17	0.55	0.72	0.17	0.56	0.73	0.34	1.10	1.44	0.34	1.13	1.47
DEL NORTE	0.00	0.01	0.02	0.00	0.01	0.02	0.01	0.02	0.03	0.01	0.02	0.03
EL DORADO	0.02	0.20	0.22	0.02	0.21	0.23	0.03	0.41	0.44	0.03	0.42	0.45
FRESNO	0.15	0.53	0.68	0.16	0.55	0.70	0.31	1.06	1.37	0.31	1.09	1.40
GLENN	0.00	0.01	0.02	0.00	0.01	0.02	0.01	0.03	0.04	0.01	0.03	0.04
HUMBOLDT	0.01	0.05	0.06	0.01	0.05	0.06	0.02	0.09	0.11	0.02	0.10	0.12
IMPERIAL	0.02	0.17	0.20	0.03	0.18	0.20	0.05	0.34	0.39	0.05	0.35	0.40
INYO	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01
KERN	0.09	0.68	0.77	0.09	0.70	0.79	0.18	1.36	1.53	0.18	1.39	1.57
KINGS	0.01	0.09	0.10	0.01	0.09	0.10	0.03	0.17	0.20	0.03	0.18	0.21
LAKE	0.00	0.05	0.06	0.00	0.05	0.06	0.01	0.10	0.11	0.01	0.11	0.12
LASSEN	0.00	0.02	0.02	0.00	0.02	0.02	0.00	0.04	0.04	0.00	0.04	0.04
LOS ANGELES	1.51	1.44	2.96	1.53	1.47	3.01	3.03	2.89	5.91	3.06	2.95	6.01
MADERA	0.01	0.16	0.17	0.01	0.17	0.18	0.03	0.32	0.35	0.03	0.33	0.36
MARIN	0.05	0.09	0.14	0.05	0.09	0.14	0.09	0.19	0.28	0.09	0.19	0.28
MARIPOSA	0.00	0.02	0.02	0.00	0.02	0.02	0.00	0.03	0.03	0.00	0.03	0.04
MENDOCINO	0.01	0.04	0.05	0.01	0.04	0.05	0.02	0.09	0.10	0.02	0.09	0.10
MERCED	0.03	0.28	0.31	0.03	0.29	0.32	0.05	0.57	0.62	0.05	0.59	0.64
MODOC	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01
MONO	0.02	0.01	0.04	0.02	0.01	0.04	0.04	0.03	0.07	0.04	0.03	0.07
MONTEREY	0.05	0.13	0.18	0.05	0.13	0.19	0.11	0.26	0.37	0.11	0.27	0.37

Table 5.3.1.5: Total Annual Cement Only ROG Rate with Safety Factor for Existing Conditions

County	Cement Only ROG Emissions (tons/year) - No Saf. Fac.						Cement Only ROG Emissions (tons/year) - With Saf. Fac.					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
NAPA	0.02	0.07	0.09	0.02	0.07	0.09	0.04	0.14	0.17	0.04	0.14	0.18
NEVADA	0.01	0.13	0.14	0.01	0.13	0.14	0.02	0.25	0.27	0.02	0.25	0.28
ORANGE	0.59	1.08	1.67	0.59	1.09	1.68	1.18	2.15	3.33	1.19	2.18	3.37
PLACER	0.05	0.49	0.54	0.05	0.50	0.55	0.10	0.98	1.08	0.10	1.01	1.11
PLUMAS	0.00	0.03	0.03	0.00	0.03	0.03	0.00	0.06	0.06	0.00	0.06	0.06
RIVERSIDE	0.29	2.90	3.19	0.30	2.98	3.28	0.58	5.81	6.39	0.59	5.96	6.56
SACRAMENTO	0.28	0.97	1.25	0.28	1.00	1.28	0.55	1.94	2.50	0.56	1.99	2.56
SAN BENITO	0.00	0.04	0.04	0.00	0.04	0.04	0.01	0.08	0.08	0.01	0.08	0.08
SAN BERNARDINO	0.31	1.42	1.73	0.31	1.46	1.77	0.62	2.84	3.46	0.63	2.91	3.54
SAN DIEGO	0.83	1.28	2.11	0.84	1.31	2.14	1.65	2.56	4.21	1.68	2.61	4.29
SAN FRANCISCO	0.13	0.02	0.15	0.14	0.02	0.16	0.27	0.04	0.31	0.27	0.04	0.32
SAN JOAQUIN	0.08	0.64	0.72	0.08	0.66	0.74	0.16	1.28	1.44	0.16	1.32	1.47
SAN LUIS OBISPO	0.04	0.20	0.24	0.04	0.20	0.25	0.08	0.40	0.48	0.08	0.41	0.49
SAN MATEO	0.12	0.15	0.27	0.12	0.16	0.28	0.24	0.31	0.55	0.24	0.31	0.55
SANTA BARBARA	0.06	0.12	0.19	0.06	0.13	0.19	0.12	0.25	0.37	0.12	0.25	0.38
SANTA CLARA	0.33	0.61	0.94	0.33	0.62	0.95	0.65	1.23	1.88	0.67	1.24	1.91
SANTA CRUZ	0.04	0.12	0.15	0.04	0.12	0.16	0.08	0.23	0.31	0.08	0.24	0.31
SHASTA	0.02	0.13	0.15	0.02	0.13	0.16	0.05	0.25	0.30	0.05	0.26	0.31
SIERRA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01
SISKIYOU	0.01	0.03	0.04	0.01	0.03	0.04	0.01	0.06	0.07	0.01	0.06	0.07
SOLANO	0.06	0.31	0.37	0.06	0.31	0.38	0.12	0.62	0.74	0.12	0.63	0.75
SONOMA	0.08	0.26	0.34	0.08	0.26	0.34	0.15	0.52	0.67	0.16	0.53	0.68
STANISLAUS	0.06	0.43	0.49	0.06	0.44	0.50	0.11	0.86	0.97	0.12	0.88	1.00
SUTTER	0.01	0.11	0.13	0.01	0.12	0.13	0.02	0.23	0.25	0.02	0.23	0.26
TEHAMA	0.01	0.06	0.06	0.01	0.06	0.06	0.01	0.11	0.13	0.01	0.11	0.13
TRINITY	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.02	0.02
TULARE	0.03	0.24	0.27	0.03	0.25	0.28	0.07	0.48	0.55	0.07	0.50	0.56
TUOLUMNE	0.00	0.06	0.06	0.00	0.06	0.06	0.01	0.12	0.13	0.01	0.12	0.13
VENTURA	0.13	0.39	0.52	0.13	0.40	0.52	0.25	0.78	1.03	0.25	0.79	1.05

Table 5.3.1.5: Total Annual Cement Only ROG Rate with Safety Factor for Existing Conditions

County	Cement Only ROG Emissions (tons/year) - No Saf. Fac.						Cement Only ROG Emissions (tons/year) - With Saf. Fac.					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
YOLO	0.04	0.14	0.18	0.04	0.14	0.18	0.08	0.28	0.36	0.08	0.29	0.37
YUBA	0.01	0.14	0.14	0.01	0.14	0.15	0.02	0.27	0.29	0.02	0.28	0.30
Statewide Total	6	18	24	6	18	24	12	36	48	12	36	49

Table 5.3.1.6: Total Daily ROG Emission Rate with Safety Factor for Existing Conditions

County	Total ROG Emissions7 - No Safety Factor (lbs/day)						Total ROG Emissions7 - With Safety Factor (lbs/day)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	2.93	5.16	8.09	2.98	5.24	8.22	5.85	10.32	16.18	5.96	10.48	16.44
ALPINE	0.02	0.04	0.06	0.02	0.04	0.06	0.04	0.07	0.11	0.04	0.07	0.11
AMADOR	0.05	0.52	0.57	0.05	0.53	0.59	0.11	1.04	1.15	0.11	1.07	1.18
BUTTE	0.47	2.11	2.58	0.48	2.16	2.64	0.95	4.21	5.16	0.96	4.33	5.29
CALAVERAS	0.03	1.12	1.14	0.03	1.15	1.18	0.05	2.24	2.29	0.05	2.30	2.35
COLUSA	0.03	0.21	0.24	0.03	0.22	0.25	0.06	0.43	0.48	0.06	0.44	0.50
CONTRA COSTA	2.22	7.71	9.93	2.25	7.90	10.15	4.45	15.42	19.87	4.50	15.79	20.29
DEL NORTE	0.06	0.17	0.23	0.06	0.18	0.24	0.12	0.34	0.47	0.13	0.35	0.48
EL DORADO	0.22	2.86	3.08	0.22	2.93	3.15	0.44	5.72	6.16	0.45	5.86	6.31
FRESNO	2.02	7.45	9.47	2.05	7.66	9.71	4.04	14.90	18.94	4.10	15.32	19.41
GLENN	0.05	0.20	0.25	0.05	0.21	0.26	0.09	0.41	0.50	0.10	0.42	0.51
HUMBOLDT	0.13	0.65	0.79	0.14	0.67	0.81	0.27	1.31	1.58	0.27	1.34	1.61
IMPERIAL	0.33	2.41	2.73	0.33	2.47	2.81	0.65	4.81	5.47	0.67	4.94	5.61
INYO	0.02	0.09	0.10	0.02	0.09	0.10	0.03	0.17	0.20	0.03	0.17	0.21
KERN	1.17	9.51	10.68	1.19	9.78	10.96	2.34	19.03	21.37	2.37	19.55	21.93
KINGS	0.18	1.22	1.40	0.19	1.25	1.44	0.37	2.44	2.81	0.37	2.51	2.88
LAKE	0.06	0.72	0.78	0.07	0.74	0.80	0.13	1.44	1.56	0.13	1.47	1.60
LASSEN	0.03	0.26	0.29	0.03	0.26	0.30	0.07	0.51	0.58	0.07	0.52	0.59
LOS ANGELES	19.98	20.24	40.22	20.23	20.67	40.90	39.96	40.47	80.43	40.46	41.35	81.81
MADERA	0.17	2.27	2.44	0.18	2.33	2.50	0.34	4.54	4.88	0.35	4.66	5.01
MARIN	0.60	1.30	1.90	0.60	1.32	1.92	1.20	2.60	3.79	1.20	2.64	3.84
MARIPOSA	0.01	0.23	0.24	0.01	0.23	0.25	0.03	0.46	0.48	0.03	0.47	0.50
MENDOCINO	0.11	0.60	0.71	0.11	0.61	0.72	0.22	1.19	1.42	0.22	1.22	1.44
MERCED	0.34	4.00	4.33	0.34	4.11	4.45	0.68	7.99	8.67	0.69	8.21	8.90
MODOC	0.01	0.08	0.09	0.01	0.08	0.09	0.02	0.16	0.19	0.02	0.16	0.19
MONO	0.28	0.20	0.48	0.29	0.21	0.49	0.56	0.40	0.97	0.57	0.41	0.99
MONTEREY	0.71	1.82	2.53	0.71	1.86	2.58	1.42	3.64	5.06	1.43	3.73	5.16

Table 5.3.1.6: Total Daily ROG Emission Rate with Safety Factor for Existing Conditions

County	Total ROG Emissions7 - No Safety Factor (lbs/day)						Total ROG Emissions7 - With Safety Factor (lbs/day)					
	MF Design[1]	SF Design[1]	MF+SF Design[1]	MF Max	SF Max	MF+SF Max	MF Design[1]	SF Design[1]	MF+SF Design[1]	MF Max	SF Max	MF+SF Max
NAPA	0.23	0.96	1.19	0.24	0.98	1.22	0.46	1.92	2.38	0.47	1.96	2.43
NEVADA	0.13	1.76	1.89	0.14	1.79	1.92	0.27	3.52	3.79	0.28	3.57	3.85
ORANGE	7.78	15.09	22.87	7.85	15.28	23.13	15.55	30.19	45.74	15.70	30.55	46.25
PLACER	0.65	6.88	7.53	0.65	7.07	7.72	1.29	13.77	15.06	1.31	14.14	15.44
PLUMAS	0.03	0.40	0.43	0.03	0.41	0.44	0.05	0.81	0.86	0.05	0.83	0.88
RIVERSIDE	3.83	40.72	44.55	3.92	41.81	45.73	7.66	81.44	89.10	7.84	83.63	91.46
SACRAMENTO	3.65	13.62	17.27	3.70	13.98	17.69	7.30	27.23	34.53	7.40	27.97	35.37
SAN BENITO	0.05	0.53	0.58	0.05	0.53	0.58	0.10	1.06	1.16	0.11	1.06	1.17
SAN BERNARDINO	4.08	19.92	24.00	4.13	20.44	24.56	8.16	39.83	48.00	8.26	40.87	49.13
SAN DIEGO	10.91	17.96	28.86	11.06	18.30	29.36	21.81	35.91	57.73	22.12	36.61	58.73
SAN FRANCISCO	1.77	0.29	2.06	1.81	0.29	2.10	3.54	0.58	4.12	3.62	0.59	4.20
SAN JOAQUIN	1.02	9.00	10.02	1.03	9.24	10.28	2.05	18.00	20.04	2.06	18.49	20.55
SAN LUIS OBISPO	0.53	2.80	3.33	0.53	2.87	3.41	1.06	5.61	6.66	1.07	5.75	6.82
SAN MATEO	1.57	2.17	3.74	1.58	2.19	3.77	3.13	4.34	7.47	3.15	4.39	7.54
SANTA BARBARA	0.81	1.74	2.55	0.82	1.78	2.60	1.62	3.48	5.10	1.63	3.56	5.19
SANTA CLARA	4.32	8.62	12.94	4.39	8.72	13.11	8.64	17.24	25.89	8.79	17.44	26.22
SANTA CRUZ	0.50	1.63	2.14	0.51	1.66	2.17	1.01	3.26	4.27	1.02	3.32	4.34
SHASTA	0.32	1.79	2.11	0.33	1.83	2.16	0.65	3.58	4.22	0.66	3.66	4.32
SIERRA	0.01	0.05	0.05	0.01	0.05	0.06	0.01	0.10	0.11	0.01	0.10	0.11
SISKIYOU	0.08	0.43	0.50	0.08	0.44	0.51	0.15	0.85	1.01	0.16	0.87	1.03
SOLANO	0.80	4.32	5.13	0.81	4.41	5.22	1.61	8.64	10.25	1.63	8.82	10.44
SONOMA	1.02	3.63	4.64	1.03	3.68	4.72	2.03	7.25	9.28	2.07	7.37	9.43
STANISLAUS	0.75	6.01	6.77	0.76	6.17	6.93	1.51	12.02	13.53	1.52	12.35	13.87
SUTTER	0.16	1.60	1.77	0.16	1.65	1.81	0.32	3.21	3.53	0.33	3.29	3.62
TEHAMA	0.09	0.78	0.88	0.09	0.81	0.90	0.19	1.57	1.76	0.19	1.61	1.80
TRINITY	0.01	0.15	0.15	0.01	0.15	0.16	0.02	0.29	0.31	0.02	0.30	0.31
TULARE	0.45	3.38	3.83	0.46	3.47	3.93	0.90	6.75	7.65	0.91	6.94	7.86
TUOLUMNE	0.06	0.83	0.89	0.06	0.84	0.91	0.12	1.66	1.78	0.12	1.69	1.81
VENTURA	1.66	5.48	7.14	1.68	5.57	7.25	3.31	10.96	14.27	3.37	11.13	14.50

Table 5.3.1.6: Total Daily ROG Emission Rate with Safety Factor for Existing Conditions

County	Total ROG Emissions7 - No Safety Factor (lbs/day)						Total ROG Emissions7 - With Safety Factor (lbs/day)					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
YOLO	0.52	1.95	2.47	0.53	2.00	2.53	1.05	3.89	4.94	1.07	4.00	5.07
YUBA	0.10	1.92	2.02	0.10	1.97	2.07	0.20	3.84	4.05	0.20	3.95	4.15
Statewide Total	80	250	330	81	255	337	160	499	659	162	511	673

Table 5.3.1.7: Total Daily Cement Only ROG Rate with Safety Factor for Existing Conditions

County	Cement Only ROG Emissions (lbs/day) - No Safety Factor						Cement Only ROG Emissions (lbs/day) - With Safety Factor					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
ALAMEDA	2.26	3.76	6.02	2.30	3.81	6.12	4.52	7.51	12.04	4.61	7.62	12.23
ALPINE	0.02	0.03	0.04	0.02	0.03	0.04	0.03	0.05	0.08	0.03	0.05	0.08
AMADOR	0.04	0.38	0.42	0.04	0.39	0.43	0.08	0.76	0.84	0.08	0.78	0.86
BUTTE	0.37	1.53	1.90	0.37	1.58	1.95	0.73	3.07	3.80	0.74	3.15	3.89
CALAVERAS	0.02	0.81	0.83	0.02	0.84	0.86	0.04	1.63	1.67	0.04	1.67	1.71
COLUSA	0.02	0.16	0.18	0.02	0.16	0.18	0.04	0.31	0.35	0.04	0.32	0.36
CONTRA COSTA	1.72	5.61	7.33	1.74	5.75	7.49	3.44	11.22	14.66	3.48	11.49	14.97
DEL NORTE	0.05	0.12	0.17	0.05	0.13	0.18	0.10	0.25	0.34	0.10	0.26	0.35
EL DORADO	0.17	2.08	2.25	0.17	2.13	2.31	0.34	4.16	4.50	0.35	4.26	4.61
FRESNO	1.56	5.42	6.98	1.58	5.57	7.16	3.12	10.84	13.96	3.17	11.15	14.31
GLENN	0.04	0.15	0.18	0.04	0.15	0.19	0.07	0.30	0.37	0.07	0.30	0.38
HUMBOLDT	0.10	0.48	0.58	0.11	0.49	0.59	0.21	0.95	1.16	0.21	0.98	1.19
IMPERIAL	0.25	1.75	2.00	0.26	1.80	2.06	0.50	3.50	4.01	0.52	3.60	4.12
INYO	0.01	0.06	0.08	0.01	0.06	0.08	0.03	0.12	0.15	0.03	0.13	0.15
KERN	0.91	6.92	7.83	0.92	7.11	8.03	1.81	13.85	15.66	1.84	14.23	16.06
KINGS	0.14	0.89	1.03	0.14	0.91	1.06	0.28	1.78	2.06	0.29	1.83	2.11
LAKE	0.05	0.52	0.57	0.05	0.54	0.59	0.10	1.04	1.14	0.10	1.07	1.17
LASSEN	0.03	0.19	0.21	0.03	0.19	0.22	0.05	0.37	0.42	0.05	0.38	0.43
LOS ANGELES	15.44	14.73	30.17	15.64	15.04	30.68	30.88	29.45	60.33	31.27	30.09	61.36
MADERA	0.13	1.65	1.78	0.14	1.69	1.83	0.27	3.30	3.57	0.27	3.39	3.66
MARIN	0.46	0.94	1.41	0.46	0.96	1.42	0.92	1.89	2.81	0.93	1.92	2.85
MARIPOSA	0.01	0.17	0.18	0.01	0.17	0.18	0.02	0.33	0.35	0.02	0.34	0.36
MENDOCINO	0.09	0.43	0.52	0.09	0.44	0.53	0.17	0.87	1.04	0.17	0.89	1.06
MERCED	0.26	2.91	3.17	0.27	2.99	3.25	0.52	5.82	6.34	0.53	5.98	6.51
MODOC	0.01	0.06	0.07	0.01	0.06	0.07	0.02	0.12	0.14	0.02	0.12	0.14
MONO	0.22	0.15	0.36	0.22	0.15	0.37	0.43	0.29	0.73	0.44	0.30	0.74
MONTEREY	0.55	1.33	1.87	0.55	1.36	1.91	1.10	2.65	3.75	1.10	2.71	3.82

Table 5.3.1.7: Total Daily Cement Only ROG Rate with Safety Factor for Existing Conditions

County	Cement Only ROG Emissions (lbs/day) - No Safety Factor						Cement Only ROG Emissions (lbs/day) - With Safety Factor					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
NAPA	0.18	0.70	0.88	0.18	0.71	0.90	0.36	1.40	1.75	0.36	1.43	1.79
NEVADA	0.10	1.28	1.38	0.11	1.30	1.41	0.21	2.56	2.77	0.21	2.60	2.81
ORANGE	6.01	10.98	16.99	6.07	11.12	17.18	12.02	21.97	33.99	12.14	22.23	34.37
PLACER	0.50	5.01	5.51	0.51	5.14	5.65	1.00	10.02	11.02	1.01	10.29	11.30
PLUMAS	0.02	0.29	0.31	0.02	0.30	0.32	0.04	0.59	0.63	0.04	0.60	0.64
RIVERSIDE	2.96	29.63	32.59	3.03	30.43	33.46	5.92	59.27	65.19	6.06	60.86	66.91
SACRAMENTO	2.82	9.91	12.73	2.86	10.18	13.04	5.64	19.82	25.46	5.72	20.35	26.08
SAN BENITO	0.04	0.38	0.42	0.04	0.39	0.43	0.08	0.77	0.85	0.08	0.77	0.86
SAN BERNARDINO	3.15	14.49	17.65	3.19	14.87	18.06	6.31	28.99	35.30	6.38	29.74	36.12
SAN DIEGO	8.43	13.07	21.50	8.55	13.32	21.87	16.86	26.14	42.99	17.09	26.64	43.73
SAN FRANCISCO	1.37	0.21	1.58	1.40	0.21	1.61	2.73	0.42	3.16	2.80	0.43	3.22
SAN JOAQUIN	0.79	6.55	7.34	0.80	6.73	7.52	1.58	13.10	14.68	1.59	13.46	15.05
SAN LUIS OBISPO	0.41	2.04	2.45	0.41	2.09	2.50	0.82	4.08	4.90	0.83	4.18	5.01
SAN MATEO	1.21	1.58	2.79	1.22	1.60	2.81	2.42	3.16	5.58	2.44	3.19	5.63
SANTA BARBARA	0.63	1.27	1.89	0.63	1.30	1.93	1.25	2.54	3.79	1.26	2.59	3.85
SANTA CLARA	3.34	6.27	9.61	3.40	6.35	9.74	6.68	12.55	19.23	6.79	12.69	19.48
SANTA CRUZ	0.39	1.19	1.58	0.39	1.21	1.60	0.78	2.38	3.15	0.79	2.41	3.20
SHASTA	0.25	1.30	1.55	0.25	1.33	1.59	0.50	2.60	3.10	0.51	2.66	3.17
SIERRA	0.01	0.03	0.04	0.01	0.04	0.04	0.01	0.07	0.08	0.01	0.07	0.08
SISKIYOU	0.06	0.31	0.37	0.06	0.32	0.38	0.12	0.62	0.74	0.12	0.64	0.76
SOLANO	0.62	3.15	3.77	0.63	3.21	3.84	1.24	6.29	7.53	1.26	6.42	7.67
SONOMA	0.78	2.64	3.42	0.80	2.68	3.48	1.57	5.28	6.85	1.60	5.36	6.96
STANISLAUS	0.58	4.37	4.96	0.59	4.49	5.08	1.16	8.75	9.91	1.17	8.98	10.16
SUTTER	0.13	1.17	1.29	0.13	1.20	1.32	0.25	2.33	2.58	0.25	2.40	2.65
TEHAMA	0.07	0.57	0.64	0.07	0.59	0.66	0.15	1.14	1.29	0.15	1.17	1.32
TRINITY	0.01	0.11	0.11	0.01	0.11	0.12	0.02	0.21	0.23	0.02	0.21	0.23
TULARE	0.35	2.46	2.80	0.35	2.53	2.88	0.69	4.92	5.61	0.70	5.05	5.76
TUOLUMNE	0.05	0.60	0.65	0.05	0.61	0.66	0.10	1.21	1.30	0.10	1.23	1.32
VENTURA	1.28	3.99	5.27	1.30	4.05	5.35	2.56	7.98	10.54	2.60	8.10	10.70

Table 5.3.1.7: Total Daily Cement Only ROG Rate with Safety Factor for Existing Conditions

County	Cement Only ROG Emissions (lbs/day) - No Safety Factor						Cement Only ROG Emissions (lbs/day) - With Safety Factor					
	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF	MF	SF	MF+SF
	Design[1]	Design[1]	Design[1]	Max	Max	Max	Design[1]	Design[1]	Design[1]	Max	Max	Max
YOLO	0.41	1.42	1.82	0.41	1.46	1.87	0.81	2.83	3.64	0.83	2.91	3.74
YUBA	0.08	1.40	1.48	0.08	1.44	1.51	0.16	2.80	2.95	0.16	2.87	3.03
Statewide Total	62	182	244	63	186	249	124	363	487	126	372	497

Table 5.3.1.8: Comparison of Annual County Emissions to the Most Restrictive District Threshold for Existing Conditions

County	Annual Summary (tons/year)								Most Restrictive Annual Standard (tons/year)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
ALAMEDA	0.6	1.2	0.8	1.6	0.6	1.2	0.8	1.6	15								
ALPINE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-								
AMADOR	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	25								
BUTTE	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.5	-								
CALAVERAS	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	10								
COLUSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10								
CONTRA COSTA	0.7	1.4	1.0	1.9	0.7	1.5	1.0	2.0	15								
DEL NORTE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-								
EL DORADO	0.2	0.4	0.3	0.6	0.2	0.5	0.3	0.6	-								
FRESNO	0.7	1.4	0.9	1.9	0.7	1.4	1.0	1.9	10								
GLENN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-								
HUMBOLDT	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	-								
IMPERIAL	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.6	10								
INYO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-								
KERN	0.8	1.5	1.0	2.1	0.8	1.6	1.1	2.1	25								
KINGS	0.1	0.2	0.1	0.3	0.1	0.2	0.1	0.3	10								
LAKE	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	-								
LASSEN	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	-								
LOS ANGELES	3.0	5.9	3.9	7.9	3.0	6.0	4.0	8.0	25								
MADERA	0.2	0.3	0.2	0.5	0.2	0.4	0.2	0.5	10								
MARIN	0.1	0.3	0.2	0.4	0.1	0.3	0.2	0.4	15								

Table 5.3.1.8: Comparison of Annual County Emissions to the Most Restrictive District Threshold for Existing Conditions																	
County	Annual Summary (tons/year)								Most Restrictive Annual Standard (tons/year)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
MARIPOSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100								
MENDOCINO	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	40								
MERCED	0.3	0.6	0.4	0.8	0.3	0.6	0.4	0.9	10								
MODOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	250								
MONO	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	-								
MONTEREY	0.2	0.4	0.2	0.5	0.2	0.4	0.3	0.5	-								
NAPA	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	15								
NEVADA	0.1	0.3	0.2	0.4	0.1	0.3	0.2	0.4	50								
ORANGE	1.7	3.3	2.2	4.5	1.7	3.4	2.3	4.5	-								
PLACER	0.5	1.1	0.7	1.5	0.6	1.1	0.8	1.5	-								
PLUMAS	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	50								
RIVERSIDE	3.2	6.4	4.4	8.7	3.3	6.6	4.5	9.0	10								
SACRAMENTO	1.2	2.5	1.7	3.4	1.3	2.6	1.7	3.5	-								
SAN BENITO	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	-								
SAN BERNARDINO	1.7	3.5	2.4	4.7	1.8	3.5	2.4	4.8	10								
SAN DIEGO	2.1	4.2	2.8	5.7	2.1	4.3	2.9	5.8	-								
SAN FRANCISCO	0.2	0.3	0.2	0.4	0.2	0.3	0.2	0.4	15								
SAN JOAQUIN	0.7	1.4	1.0	2.0	0.7	1.5	1.0	2.0	10								
SAN LUIS OBISPO	0.2	0.5	0.3	0.7	0.2	0.5	0.3	0.7	10								
SAN MATEO	0.3	0.5	0.4	0.7	0.3	0.6	0.4	0.7	15								
SANTA BARBARA	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.5	-								
SANTA CLARA	0.9	1.9	1.3	2.5	1.0	1.9	1.3	2.6	15								
SANTA CRUZ	0.2	0.3	0.2	0.4	0.2	0.3	0.2	0.4	-								

Table 5.3.1.8: Comparison of Annual County Emissions to the Most Restrictive District Threshold for Existing Conditions

County	Annual Summary (tons/year)								Most Restrictive Annual Standard (tons/year)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
SHASTA	0.2	0.3	0.2	0.4	0.2	0.3	0.2	0.4	-								
SIERRA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40								
SISKIYOU	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	15								
SOLANO	0.4	0.7	0.5	1.0	0.4	0.8	0.5	1.0	25								
SONOMA	0.3	0.7	0.5	0.9	0.3	0.7	0.5	0.9	15								
STANISLAUS	0.5	1.0	0.7	1.3	0.5	1.0	0.7	1.4	10								
SUTTER	0.1	0.3	0.2	0.3	0.1	0.3	0.2	0.4	-								
TEHAMA	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	10								
TRINITY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-								
TULARE	0.3	0.5	0.4	0.7	0.3	0.6	0.4	0.8	10								
TUOLUMNE	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	100								
VENTURA	0.5	1.0	0.7	1.4	0.5	1.0	0.7	1.4	5								
YOLO	0.2	0.4	0.2	0.5	0.2	0.4	0.2	0.5	25								
YUBA	0.1	0.3	0.2	0.4	0.1	0.3	0.2	0.4	-								
Statewide Total	24	48	32	65	24	49	33	66									

Table 5.3.1.9: Comparison of Daily County Emissions to the Most Restrictive District Threshold for Existing Conditions

County	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max				Threshold	Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
ALAMEDA	6.0	12.0	8.1	16.2	6.1	12.2	8.2	16.4	80								
ALPINE	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	150								
AMADOR	0.4	0.8	0.6	1.1	0.4	0.9	0.6	1.2	-								
BUTTE	1.9	3.8	2.6	5.2	1.9	3.9	2.6	5.3	25								
CALAVERAS	0.8	1.7	1.1	2.3	0.9	1.7	1.2	2.4	-								
COLUSA	0.2	0.4	0.2	0.5	0.2	0.4	0.2	0.5	-								
CONTRA COSTA	7.3	14.7	9.9	19.9	7.5	15.0	10.1	20.3	80								
DEL NORTE	0.2	0.3	0.2	0.5	0.2	0.4	0.2	0.5	-								
EL DORADO	2.3	4.5	3.1	6.2	2.3	4.6	3.2	6.3	82								
FRESNO	7.0	14.0	9.5	18.9	7.2	14.3	9.7	19.4	-								
GLENN	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.5	25								
HUMBOLDT	0.6	1.2	0.8	1.6	0.6	1.2	0.8	1.6	-								
IMPERIAL	2.0	4.0	2.7	5.5	2.1	4.1	2.8	5.6	55								
INYO	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	150								
KERN	7.8	15.7	10.7	21.4	8.0	16.1	11.0	21.9	137								
KINGS	1.0	2.1	1.4	2.8	1.1	2.1	1.4	2.9	-								
LAKE	0.6	1.1	0.8	1.6	0.6	1.2	0.8	1.6	150								
LASSEN	0.2	0.4	0.3	0.6	0.2	0.4	0.3	0.6	150								
LOS ANGELES	30.2	60.3	40.2	80.4	30.7	61.4	40.9	81.8	55		Y		Y		Y		Y
MADERA	1.8	3.6	2.4	4.9	1.8	3.7	2.5	5.0	-								
MARIN	1.4	2.8	1.9	3.8	1.4	2.8	1.9	3.8	80								
MARIPOSA	0.2	0.4	0.2	0.5	0.2	0.4	0.2	0.5	-								
MENDOCINO	0.5	1.0	0.7	1.4	0.5	1.1	0.7	1.4	-								
MERCED	3.2	6.3	4.3	8.7	3.3	6.5	4.4	8.9	-								
MODOC	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	250								

Table 5.3.1.9: Comparison of Daily County Emissions to the Most Restrictive District Threshold for Existing Conditions																	
	Daily Summary (lbs/day)								**Most Restrictive Daily Standard (lbs/day)**								
	Design[1]				**Max**				**Threshold**	**Design[1]**				**Max**			
	Cement Only		**Cement + Primer**		**Cement Only**		**Cement + Primer**			**Cement Only**		**Cement + Primer**		**Cement Only**		**Cement + Primer**	
County	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**lbs/day**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**	**No S.F.**	**With S.F.**
MONO	0.4	0.7	0.5	1.0	0.4	0.7	0.5	1.0	150								
MONTEREY	1.9	3.7	2.5	5.1	1.9	3.8	2.6	5.2	82								
NAPA	0.9	1.8	1.2	2.4	0.9	1.8	1.2	2.4	80								
NEVADA	1.4	2.8	1.9	3.8	1.4	2.8	1.9	3.8	137								
ORANGE	17.0	34.0	22.9	45.7	17.2	34.4	23.1	46.3	55								
PLACER	5.5	11.0	7.5	15.1	5.6	11.3	7.7	15.4	82								
PLUMAS	0.3	0.6	0.4	0.9	0.3	0.6	0.4	0.9	137								
RIVERSIDE	32.6	65.2	44.6	89.1	33.5	66.9	45.7	91.5	10	Y	Y	Y	Y	Y	Y	Y	Y
SACRAMENTO	12.7	25.5	17.3	34.5	13.0	26.1	17.7	35.4	65								
SAN BENITO	0.4	0.8	0.6	1.2	0.4	0.9	0.6	1.2	82								
SAN BERNARDINO	17.6	35.3	24.0	48.0	18.1	36.1	24.6	49.1	55								
SAN DIEGO	21.5	43.0	28.9	57.7	21.9	43.7	29.4	58.7	250								
SAN FRANCISCO	1.6	3.2	2.1	4.1	1.6	3.2	2.1	4.2	80								
SAN JOAQUIN	7.3	14.7	10.0	20.0	7.5	15.0	10.3	20.6	-								
SAN LUIS OBISPO	2.4	4.9	3.3	6.7	2.5	5.0	3.4	6.8	10								
SAN MATEO	2.8	5.6	3.7	7.5	2.8	5.6	3.8	7.5	80								
SANTA BARBARA	1.9	3.8	2.6	5.1	1.9	3.9	2.6	5.2	25								
SANTA CLARA	9.6	19.2	12.9	25.9	9.7	19.5	13.1	26.2	80								
SANTA CRUZ	1.6	3.2	2.1	4.3	1.6	3.2	2.2	4.3	82								
SHASTA	1.6	3.1	2.1	4.2	1.6	3.2	2.2	4.3	25								
SIERRA	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	-								
SISKIYOU	0.4	0.7	0.5	1.0	0.4	0.8	0.5	1.0	80								
SOLANO	3.8	7.5	5.1	10.3	3.8	7.7	5.2	10.4	-								
SONOMA	3.4	6.8	4.6	9.3	3.5	7.0	4.7	9.4	80								
STANISLAUS	5.0	9.9	6.8	13.5	5.1	10.2	6.9	13.9	-								
SUTTER	1.3	2.6	1.8	3.5	1.3	2.6	1.8	3.6	25								

Table 5.3.1.9: Comparison of Daily County Emissions to the Most Restrictive District Threshold for Existing Conditions																		
	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)									
	Design[1]				Max				Threshold	Design[1]				Max				
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer		
County	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
TEHAMA	0.6	1.3	0.9	1.8	0.7	1.3	0.9	1.8	-								
TRINITY	0.1	0.2	0.2	0.3	0.1	0.2	0.2	0.3	-								
TULARE	2.8	5.6	3.8	7.7	2.9	5.8	3.9	7.9	-								
TUOLUMNE	0.7	1.3	0.9	1.8	0.7	1.3	0.9	1.8	1000								
VENTURA	5.3	10.5	7.1	14.3	5.4	10.7	7.2	14.5	-								
YOLO	1.8	3.6	2.5	4.9	1.9	3.7	2.5	5.1	-								
YUBA	1.5	3.0	2.0	4.0	1.5	3.0	2.1	4.1	25								
Statewide Total	**244**	**487**	**330**	**659**	**249**	**497**	**337**	**673**									

Y - Indicates a standard is exceeded

Table 5.3.1.10: Comparison of Annual District Emissions to the Most Restrictive District Threshold for Existing Conditions

Air District	Annual Summary (tons/year)									Most Restrictive Annual Standard (tons/year)							
	Design[1]				Max					Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	Threshold tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
Amador County APCD	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	25								
Bay Area AQMD	3.6	7.2	4.9	9.7	3.7	7.3	4.9	9.9	15								
Butte County AQMD	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.5	-								
Calaveras	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	10								
Colusa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10								
El Dorado County APCD	0.2	0.4	0.3	0.6	0.2	0.5	0.3	0.6	-								
Feather River AQMD	0.3	0.5	0.4	0.7	0.3	0.6	0.4	0.8	-								
Glenn	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-								
Great Basin	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	-								
Imperial County APCD	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.6	10								
Kern County APCD	0.8	1.5	1.0	2.1	0.8	1.6	1.1	2.1	25								
Lake County AQMD	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	-								
Lassen	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	-								
Mariposa County APCD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100								
Mendocino County AQMD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	40								
Modoc County APCD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	250								
Mojave Desert South Coast AQMD	4.9	9.8	6.7	13.4	5.0	10.1	6.9	13.8	10				Y		Y		Y
Monterey Bay Unified APCD	0.4	0.8	0.5	1.0	0.4	0.8	0.5	1.0	-								
North Coast Unified AQMD	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	10								
Northern Sierra AQMD	0.2	0.3	0.2	0.5	0.2	0.3	0.2	0.5	50								
Placer County APCD	0.5	1.1	0.7	1.5	0.6	1.1	0.8	1.5	-								
Sacramento Metropolitan AQMD	1.2	2.5	1.7	3.4	1.3	2.6	1.7	3.5	10								

Table 5.3.1.10: Comparison of Annual District Emissions to the Most Restrictive District Threshold for Existing Conditions

	Annual Summary (tons/year)								Most Restrictive Annual Standard (tons/year)								
	Design[1]				Max					Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
Air District	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	Threshold tons/year	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
San Diego APCD	2.1	4.2	2.8	5.7	2.1	4.3	2.9	5.8	-								
San Joaquin Valley APCD	3.5	7.0	4.8	9.6	3.6	7.2	4.9	9.8	10								
San Luis Obispo County APCD	0.2	0.5	0.3	0.7	0.2	0.5	0.3	0.7	10								
Santa Barbara County APCD	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.5	-								
Shasta County AQMD	0.2	0.3	0.2	0.4	0.2	0.3	0.2	0.4	-								
Siskiyou County APCD	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	40								
South Coast AQMD	9.5	19.1	12.9	25.8	9.7	19.5	13.2	26.3	-								
Tehama County APCD	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	10								
Tuolumne County APCD	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	100								
Ventura County APCD	0.5	1.0	0.7	1.4	0.5	1.0	0.7	1.4	5								
Yolo Solano AQMD	0.5	1.1	0.7	1.5	0.6	1.1	0.8	1.5	25								

Y - Indicates a standard is exceeded

Table 5.3.1.11: Comparison of Daily District Emissions to the Most Restrictive District Threshold for Existing Conditions

Air District	Daily Summary (lbs/day)								Most Restrictive Daily Standard (lbs/day)								
	Design[1]				Max					Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	Threshold lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
Amador County APCD	0.4	0.8	0.6	1.1	0.4	0.9	0.6	1.2	-								
Bay Area AQMD	36.8	73.6	49.6	99.2	37.4	74.8	50.4	100.9	80				Y				Y
Butte County AQMD	1.9	3.8	2.6	5.2	1.9	3.9	2.6	5.3	25								
Calaveras	0.8	1.7	1.1	2.3	0.9	1.7	1.2	2.4	-								
Colusa	0.2	0.4	0.2	0.5	0.2	0.4	0.2	0.5	-								
El Dorado County APCD	2.3	4.5	3.1	6.2	2.3	4.6	3.2	6.3	82								
Feather River AQMD	2.8	5.5	3.8	7.6	2.8	5.7	3.9	7.8	25								
Glenn	0.2	0.4	0.3	0.5	0.2	0.4	0.3	0.5	25								
Great Basin	0.5	1.0	0.6	1.3	0.5	1.0	0.7	1.3	150								
Imperial County APCD	2.0	4.0	2.7	5.5	2.1	4.1	2.8	5.6	55								
Kern County APCD	7.8	15.7	10.7	21.4	8.0	16.1	11.0	21.9	137								
Lake County AQMD	0.6	1.1	0.8	1.6	0.6	1.2	0.8	1.6	150								
Lassen	0.2	0.4	0.3	0.6	0.2	0.4	0.3	0.6	150								
Mariposa County APCD	0.2	0.4	0.2	0.5	0.2	0.4	0.2	0.5	-								
Mendocino County AQMD	0.5	1.0	0.7	1.4	0.5	1.1	0.7	1.4	-								
Modoc County APCD	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	250								
Mojave Desert South Coast AQMD	50.2	100.5	68.5	137.1	51.5	103.0	70.3	140.6	10	Y	Y	Y	Y	Y	Y	Y	Y
Monterey Bay Unified APCD	3.9	7.8	5.2	10.5	3.9	7.9	5.3	10.7	82								
North Coast Unified AQMD	0.9	1.7	1.2	2.4	0.9	1.8	1.2	2.4	-								
Northern Sierra AQMD	1.7	3.5	2.4	4.8	1.8	3.5	2.4	4.8	137								
Placer County APCD	5.5	11.0	7.5	15.1	5.6	11.3	7.7	15.4	82								
Sacramento Metropolitan AQMD	12.7	25.5	17.3	34.5	13.0	26.1	17.7	35.4	65								
San Diego APCD	21.5	43.0	28.9	57.7	21.9	43.7	29.4	58.7	250								

Table 5.3.1.11: Comparison of Daily District Emissions to the Most Restrictive District Threshold for Existing Conditions

	Daily Summary (lbs/day)									**Most Restrictive Daily Standard (lbs/day)**							
	Design[1]				Max					Design[1]				Max			
	Cement Only		Cement + Primer		Cement Only		Cement + Primer			Cement Only		Cement + Primer		Cement Only		Cement + Primer	
Air District	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	Threshold lbs/day	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.	No S.F.	With S.F.
San Joaquin Valley APCD	35.9	71.8	48.9	97.9	36.8	73.6	50.2	100.4	-								
San Luis Obispo County APCD	2.4	4.9	3.3	6.7	2.5	5.0	3.4	6.8	10								
Santa Barbara County APCD	1.9	3.8	2.6	5.1	1.9	3.9	2.6	5.2	25								
Shasta County AQMD	1.6	3.1	2.1	4.2	1.6	3.2	2.2	4.3	25								
Siskiyou County APCD	0.4	0.7	0.5	1.0	0.4	0.8	0.5	1.0	-								
South Coast AQMD	97.4	194.8	131.6	263.3	99.4	198.8	134.3	268.7	55	Y	Y	Y	Y	Y	Y	Y	Y
Tehama County APCD	0.6	1.3	0.9	1.8	0.7	1.3	0.9	1.8	-								
Tuolumne County APCD	0.7	1.3	0.9	1.8	0.7	1.3	0.9	1.8	1,000								
Ventura County APCD	5.3	10.5	7.1	14.3	5.4	10.7	7.2	14.5	-								
Yolo Solano AQMD	5.6	11.2	7.6	15.2	5.7	11.4	7.8	15.5	-								

Y - Indicates a standard is exceeded

Chapter 6.0

OTHER CONSIDERATIONS

Section 15130 of the CEQA Guidelines requires an EIR to consider cumulative impacts when a project's incremental effect may be cumulatively considerable. Cumulatively considerable means that "the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."

In accordance with section 15130(b) of the CEQA Guidelines, "the discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, the discussion need not provide as great [a level of] detail as is provided for the effects attributable to the project alone." The discussion should be guided by standards of practicality and reasonableness.

In addition to cumulative impacts, this chapter presents discussions related to effects found not to be significant; significant and unavoidable impacts; significant irreversible changes; and growth-inducing impacts.

6.1. Effects Not Found to be Significant

This EIR is a Subsequent EIR to the 2000 Mitigated Negative Declaration (2000 MND) prepared pursuant to CEQA Guidelines Section 15162. Thus, this EIR evaluates the proposed change to the existing California Plumbing Code regulations regarding the use of CPVC for residential plumbing systems (i.e., deletion of the Findings Requirement) and the impact of that change. As such, this EIR will not repeat the review of impacts that remain the same as those addressed in the 2000 MND. It does not evaluate whether or not CPVC should be allowed in California in the first instance in residential structures, because such use of CPVC is already allowed throughout the state, provided that the required finding is made. This EIR does evaluate the potential increase in the use of CPVC if the finding requirement is deleted. With respect to all other impacts and all other information, the analysis of the 2000 MND continues to apply and is incorporated into this EIR.

More specifically, the Project would have no new impacts beyond those evaluated in the 2000 MND related to land use consistency; transportation/circulation; population/housing; geology/soils; agricultural resources; noise; biological resources;

drainage and hydrology; hazards and hazardous materials; cultural resources; aesthetics; recreation; or mineral resources.

6.1.1 Energy Impacts

In addition to the impacts listed above that remain the same as analyzed in the 2000 MND, this EIR does not include a detailed analysis of impacts of CPVC related to energy because the Lead Agency determined during the scoping process for this Subsequent EIR that the Project would not result in any new significant environmental effects related to energy. This decision was based in part upon the conclusion in the 1998 EIR that unrestricted statewide use of CPVC for residential potable water systems would not result in significant impacts related to energy.[260] The 1998 EIR is part of the record that supports the 2000 MND, and it is appropriate to rely on the analysis in the 1998 EIR in determining whether the currently Proposed Project would have any new or additional impacts. This prior analysis were part of the basis for the Lead Agency's determinations in the 2000 MND, located at page 1 of the Explanation of Checklist Judgments, where the Lead Agency stated, "The determinations made for this Environmental Checklist are based on information in the record for this project as well as information in the record of previous HCD examinations of CPVC for use in residential buildings."

At the outset, it is important to note that neither CPVC nor copper is produced in California. The energy inputs and other environmental effects associated with the primary production of both of these materials is beyond the scope of this EIR, since the impacts do not occur in California and it is speculative to establish where such impacts might occur. CEQA generally does not require analysis of impacts outside of California. Nevertheless, in order to provide additional disclosure to the public, this EIR includes the following information regarding potential energy impacts associated with the Project. CPVC is derived from chlorine (63-70% of the finished product), which comes from common table salt, and ethylene (30-37% of the finished product), which comes from oil or natural gas.[261] There is an almost limitless supply of common table salt. Compared to most other plastics, CPVC has a relatively low petroleum content and, therefore, its production process uses less of our non-renewable oil reserves.[262] The overall energy requirements of CPVC production also are quite low in comparison to other plastics.[263] Due to the durability and long life of CPVC pipe, the Lead Agency considers this not to

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[260] 1998 Final EIR at pp. 64-68.

[261] Noveon, *The Facts About TempRite® CPVC: How It Impacts the Environment and Our Everyday Lives*, p. 4 (2004).

[262] *Ibid*.

[263] Noveon, *The Facts About TempRite® CPVC: How It Impacts the Environment and Our Everyday Lives*, p. 8 (2004)

be a wasteful or inefficient use of non-renewable resources when compared to the use of these resources for combustion as fuel. On the contrary, it is an efficient and productive use of these resources.

After CPVC is manufactured and installed, energy usage over the life of the pipe is a function of the heat loss of hot water conveyed by it. Compared to the metal pipe materials currently in use, CPVC has a much lower heat loss, due to the extremely high thermal conductivity of metals in relation to plastics. The thermal conductivity of a copper system is 2500 times that of a CPVC system.[264] The results of a 2004 study indicate that the use of CPVC for residential hot water systems resulted in significantly less energy waste than copper.[265] For instance, the study found that a conventional slab hot water system in a new 2,010-square foot, three-bedroom, two-bath home would result in an annual energy waste (measured in terms of dollars) of $273.00 in electricity and $85.20 in gas if copper were used, and $224.04 in electricity and $69.96 in gas using CPVC.[266] In order to achieve a reasonable level of energy efficiency, many residences have plastic insulation installed on copper pipes, and insulation of all hot water pipes is required in new construction in California. Insulated CPVC pipe would have lower heat loss than insulated copper pipe, although the differences would be less dramatic. For example, the same 2004 study indicated that the system described above, if insulated, in the same residence described above would result in an annual energy waste of $60.12 in electricity and $18.72 using copper, or $55.80 in electricity and $17.40 in gas using CPVC.[267] The same study concluded from a cost/benefit viewpoint, an uninsulated conventional CPVC hot water system located in the attic was the most superior system in comparison to an uninsulated, conventional copper hot water system located in the attic.[268]

The 2004 study also evaluated the statewide energy impact of replacing copper hot water systems with CPVC in new housing units throughout California.[269] Assuming a cold start water use pattern, the study indicated the following results:

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[264] Plastic Pipe and Fittings Ass'n, *CPVC - Chlorinated Poly (Vinyl Chloride): Frequently Asked Questions*, available at http://www.ppfahome.org/cpvc/faqcpvc.html (viewed Sept. 27, 2006).

[265] Wendt, R., Baskin, E., & Durfee, D., *Evaluation of Residential Hot Water Distribution Systems by Numeric Simulation*, Table 1.1 (Buildings Technology Ctr., Oak Ridge National Laboratory, Mar. 2004).

[266] *Ibid.*

[267] *Ibid.*

[268] Wendt, R., Baskin, E., & Durfee, D., *Evaluation of Residential Hot Water Distribution Systems by Numeric Simulation*, p. 38 (Mar. 2004).

[269] Wendt, R., Baskin, E., & Durfee, D., *Evaluation of Residential Hot Water Distribution Systems by Numeric Simulation*, Tables 6.1-6.2 (Mar. 2004).

- Substituting demand recirculation, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 20,000 single-family, three-bedroom, two-bath, one-story, 2,010 square foot (s.f.) housing units per year would result in an annual savings of 116,580 million British thermal units (MBTU).
- Substituting demand recirculation, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 10,000 single-family, four-bedroom, two-and-a-half-bath, one story, 3,080 s.f. housing units per year would result in an annual savings of 63,780 MBTU.
- Substituting demand recirculation, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 15,000 single-family, four-bedroom, three-bath, two story, 2,810 s.f. housing units per year would result in an annual savings of 77,760 MBTU.
- Substituting conventional, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 25,000 two-bedroom, two-bath, one story, 960 s.f. apartment or condominium housing units per year would result in an annual savings of 7,675 MBTU.

Assuming a clustered water use pattern, the study indicated the following results:

- Substituting demand recirculation, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 38,250 single-family, three-bedroom, two-bath, one-story, 2,010 square foot (s.f.) housing units per year would result in an annual savings of 3,420 MBTU.
- Substituting demand recirculation, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 10,000 single-family, four-bedroom, two-and-a-half-bath, one story, 3,080 s.f. housing units per year would result in an annual savings of 21,980 MBTU.
- Substituting demand recirculation, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 30,000 single-family, four-bedroom, three-bath, two story, 2,810 s.f. housing units per year would result in an annual savings of 13,470 MBTU.
- Substituting conventional, CPVC, in attic, uninsulated systems for conventional, copper, in attic, uninsulated systems in 15,000 two-bedroom, two-bath, one story, 960 s.f. apartment or condominium housing units per year would result in an annual savings of 1,965 MBTU.

Given all of the results discussed above, the study recommended removing barriers to the use of CPVC when appropriate quality and durability can be demonstrated.[270] CPVC has an estimated service life of 50-75 years[271], although this is only an estimate since CPVC has only been in use for slightly less than 50 years. On the other hand, copper pipe life varies greatly depending on soil and water chemistry. In some areas of California, copper pipe potentially has a service life as long as the life of a residential building. However, in areas of California with aggressive soil or water conditions, the average life of copper pipe can be as short as two to four years.[272] In those areas, the Lead Agency considers this to be an inefficient and wasteful use of non-renewable resources. The NSF 61 certification of copper pipe has limitations on the use of copper related to the water supply and water pH.[273] If copper is used according to the NSF certification and the installation requirements of the California Plumbing Code, it appears likely that most or all of this inefficient and wasteful use of non-renewable resources would be avoided.

Copper is mined as ore, then processed, smelted, and purified prior to fabrication. Copper products may also contain recycled copper. Recycling copper requires much less energy than producing it from mined ore. It requires more energy to produce copper than CPVC from raw mineral inputs, but due to the high recycled material content of copper pipe, CPVC and copper pipe have roughly the same energy content per residential unit.[274]

In summary, the primary raw material for CPVC production, common salt, is not a scarce non-renewable resource. The non-renewable resources and energy committed to CPVC use are used efficiently in the production of a durable product. Additionally, the composition of piping for potable water use in residential buildings impacts future energy consumption in relation to the thermal conductivity of the material. CPVC has a lower thermal conductivity than the other materials approved for this use in California. Thus, overall, CPVC uses non-renewable resources and energy more efficiently than copper pipe. Based on this information, the Project would not result in significant energy impacts.

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[270] Wendt, R., Baskin, E., & Durfee, D., *Evaluation of Residential Hot Water Distribution Systems by Numeric Simulation*, p. 5 (Mar. 2004).
[271] 1998 Final EIR at 66.
[272] *Ibid.*
[273] NSF Restriction Statement: Copper tube (Alloy C12200).
[274] 1998 Final EIR at 67.

6.2. Growth-Inducing and Indirect Impacts

The proposed Project is the adoption of regulations for the California Plumbing Code that will allow use of CPVC pipe as an alternative material for residential potable water systems without the requirement that a local building official make certain findings. As such, growth-inducing impacts are not expected.

This is not a typical CEQA project where a specific, discrete action will be taken. The regulatory changes that comprise the Project will cause no direct impacts to the environment. However, the Project may cause indirect changes in the environment when others act on that regulation. Therefore, all impacts analyzed throughout this EIR would be indirect environmental impacts of the Project. Other than those impacts identified elsewhere in this EIR, no other indirect environmental impacts are expected. However, it is likely that there will be cost savings for homebuilders and homeowners who are repiping existing residential structures due to the relative inexpensiveness of CPVC compared to copper. Although CPVC pipe may be cheaper than copper pipe, which is more commonly used, the price difference is not reasonably expected to result in increased housing or population growth. In addition, the Project is not expected to eliminate any obstacles to growth (as might result, for example, from a change in the General Plan designation or zoning of real property) or to induce or accommodate growth (as might result, for example, from the construction of new infrastructure).

6.3 Cumulative Impacts

An EIR must discuss the "cumulative impacts" of a project when its incremental effects will be cumulatively considerable. This means that the incremental effects of the individual project would be considerable when viewed in connection with the effects of other current projects, and the effects of probable future projects. This section of the RDEIR includes an analysis of potential cumulative impacts related to air quality and water quality.

6.3.1 Cumulative Air Quality Impacts

As explained in the discussion of air quality impacts of the Project under Impact 4.2-1 in Section 4.2 of this RDEIR, the Project will indirectly generate ozone precursors that could lead to ozone formation. Several areas within California are classified as non-attainment for state and federal ozone regulations. Specifically, as shown in Table 4.2-2 of this RDEIR, the following areas of the State are classified as non-attainment or nonattainment-transitional under state regulations:

- San Francisco Bay Area - *nonattainment*;
- North Central Coast Air Basin - *nonattainment-transitional*;

- South Central Coast Air Basin (other than San Luis Obispo County) – *nonattainment*
- South Coast Air Basin – *nonattainment*;
- San Diego Air Basin – *nonattainment*;
- Sacramento Valley Air Basin:
    - Colusa County – *nonattainment-transitional*;
    - Glenn County – *nonattainment-transitional*;
    - Remainder of Sacramento Valley Air Basin – *nonattainment*;
- San Joaquin Valley Air Basin – *nonattainment*;
- Great Basin Valleys Air Basin (Mono County) – *nonattainment*;
- Mojave Desert Air Basin – *nonattainment*;
- Salton Sea Air Basin – *nonattainment*; and
- Mountain Counties Air Basin (Amador, Calaveras, El Dorado, Nevada, Placer, Mariposa, and Tuolumne Counties) – *nonattainment*.

In addition, as shown in Figures B-2 and B-3 in Section 4.2 of this RDEIR, many of the air basins and counties listed above are classified as nonattainment under the federal 1-hour and/or 8-hour ozone standards.[275]

Even a small addition of ozone to these areas by the Project would be considered to be an incremental effect that would contribute to the problem in a manner that is cumulatively considerable. Even with the implementation of appropriate mitigation (e.g., requiring the use of low-VOC, one-step cement), this cumulative air quality impact cannot be reduced to a less-than-significant level and will remain significant and unavoidable.

6.3.2 Cumulative Water Quality Impacts

The Project potentially could have a cumulative water quality impact if the increased use of the existing flushing mitigation measure in Section 301.0.1, Appendix I, Installation Standards, California Plumbing Code, which was adopted as part of project analyzed in the 2000 MND, that would occur as a result of the increase in CPVC usage for

[275] There are no areas in the state that are federally classified as nonattainment but are not also state-classified as nonattainment. On the other hand, there are several areas that are state-classified as nonattainment or nonattainment-transitional that are federally classified as unclassified/attainment.

residential potable water systems, would add pollutants to already stressed sensitive waster bodies. The flushing measure was included in the projects evaluated in both the 1998 Final EIR and the 2000 MND. The 2000 MND concluded that, based on the Lead Agency's review in 2000 as well as earlier studies, the use of CPVC would not violate any water quality or waste discharge requirements.

The 1998 Final EIR, which is part of the administrative record supporting the 2000 MND, analyzed the water quality impacts related to the use of the flushing mitigations measure, in considering the unrestricted approval of CPVC pipe for use in residential potable water systems (i.e., with no Findings Requirement in place), which is essentially the same project as the currently proposed Project. The 1998 Final EIR concluded that there was "no evidence to support a conclusion that the flushing of . . . CPVC systems would result in significant adverse effects due to discharge of toxic substances to the environment."[276] The 1998 Final EIR explained that flushing "would be primarily to a sewage disposal system," and "there is a substantial difference between discharges to a sewage system and a direct discharge to the environment, and between flushing out a newly installed plumbing system and disposing of solvents down the drain."[277]

In addition, when the 1998 Final EIR was prepared, the Lead Agency proposed including flushing as a requirement in the proposed building standards for all potable water plumbing systems, regardless of the composition of the pipe and joining materials.[278] This requirement has subsequently been incorporated into the California Plumbing Code. The 1998 Final EIR explained that with respect to installation of metallic pipe, including copper, one of the purposes of flushing is to remove solder dross, which is regulated as a hazardous waste by the California Department of Toxic Substances Control, from the interior of the pipe prior to use.[279]

These evaluations in the 1998 EIR are part of the record that supports the 2000 MND, and it is appropriate to rely on these evaluations in determining whether the currently proposed Project would have any new or additional cumulative impacts. These prior evaluations were part of the basis for the Lead Agency's determinations in the 2000 MND, located at page 1 of the Explanation of Checklist Judgments, where the Lead Agency stated "The determinations made for this Environmental Checklist are based on information in the record for this project as well as information in the record of previous HCD examinations of CPVC for use in residential buildings." Many of the specific topical entries in that Environmental Checklist repeat this statement, and recite

[276] 1998 Final EIR at 185.
[277] 1998 Final EIR at 183.
[278] *Ibid.*
[279] 1998 Final EIR at 184.

environmental impact conclusions that are substantially similar to the conclusions in the 1998 Final EIR. Thus, the evidence already in the record confirms that this is not a new issue, and that there is no new or substantially more severe significant impact. Therefore, the Project will not result in less than significant cumulative water quality impacts.

6.4 Significant Unavoidable Adverse Impacts

The CEQA Guidelines define significant and unavoidable impacts as those that cannot be reduced to a less than significant level through the incorporation of mitigation measures. This EIR has identified a mitigation measure (requiring the use of low-VOC, one-step cement) that would reduce the Project's only potentially significant impacts, but which would not reduce those impacts to less than significant levels. Therefore, even if this mitigation measure were implemented, the Project would result in the following significant and unavoidable impacts:

- Indirect air quality impacts related to VOC emissions from the use of CPVC Adhesives; and
- Indirect cumulative air quality impacts related to VOC emissions from the use of CPVC Adhesives.
-

6.5 Significant Irreversible Changes

CEQA Guidelines Section 15126.2(c) requires an EIR to identify any significant irreversible environmental changes that could be caused by the Project. An impact would be determined to be a significant and irreversible change in the environment if:

- Development of the project would involve a large commitment of nonrenewable resources;
- The primary and secondary impacts of the project would generally commit future generations to similar uses;
- Development of the proposed project would involve uses in which irreversible damage could result from any potential environmental accidents associated with the project; or
- The phasing and eventual development of the project would result in an unjustified consumption of resources.

As explained above in Section 6.4, the Project would have significant and unavoidable project and cumulative air quality impacts related to VOC emissions from the use of CPVC Adhesives. However, these would not be a significant and irreversible impacts, as they would not involve a large commitment of nonrenewable resources, would not commit future generations to similar uses, would not involve uses with the potential for environmental accidents that could result in irreversible damage; and neither would involve phasing or development nor would result in an unjustified consumption of resources.

In addition, the Project would not result in any significant and irreversible impacts related to the manufacturing of CPVC. It is important to note that neither CPVC nor copper is produced in California. The energy inputs and other environmental effects associated with the primary production of both of these materials is beyond the scope of this EIR, since the impacts do not occur in California and it is speculative to establish where such impacts might occur. CEQA generally does not require analysis of impacts outside of California. Therefore, the Project will not lead to any significant and irreversible environmental changes.

Moreover, as explained above in Section 6.1.1, CPVC is derived from chlorine (63-70% of the finished product), which comes from common table salt, and ethylene (30-37% of the finished product), which comes from oil or natural gas.[280] Compared to most other plastics, CPVC has a relatively low petroleum content and, therefore, its production process uses less of our non-renewable oil reserves.[281] The overall energy requirements of CPVC production also are quite low in comparison to other plastics.[282] Due to the durability and long life of CPVC pipe, the Lead Agency considers this not to be a wasteful or inefficient use of non-renewable resources when compared to the use of these resources for combustion as fuel. On the contrary, it is an efficient and productive use of these resources.

In addition, as Section 6.1.1 explains in more detail, the thermal conductivity of CPVC pipe is much less than the thermal conductivity of copper pipe. Therefore, CPVC pipe has significant savings in terms of the amount of energy used for heating water in residential potable water systems compared to the amount of energy used for heating water with the use of copper pipe. Given the durability and long life of CPVC pipe within residential plumbing systems, this savings in non-renewable resources used to heat water more than compensates for the relatively efficient and productive use of fossil fuels in manufacturing CPVC.

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[280] Noveon, *The Facts About TempRite® CPVC: How It Impacts the Environment and Our Everyday Lives*, p. 4 (2004).

[281] *Ibid*.

[282] Noveon, *The Facts About TempRite® CPVC: How It Impacts the Environment and Our Everyday Lives*, p. 8 (2004)

Chapter 7.0

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Chapter 8.0

BIOGRAPHY

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Appendices

Appendix A

NOTICE OF PREPARATION

Appendix B

SCOPING MEETING

Appendix C

NOP COMMENTS

Appendix D

STUDY RESULTS